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# THE REVIEW OF APPLIED ENTOMOLOGY.

## SERIES B: MEDICAL AND VETERINARY.

## VOL. VIII.

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# ERRATA.

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|---|---|---|---|---|---|---|---|
| Page | 56 | line | 11 | for | " *Mysorhynchus* " | read | " *Myzorhynchus* " |
| ,, | 102 | ,, | 37 | ,, | " Leaches " | ,, | " Leeches " |
| ,, | 119 | ,, | 32 | ,, | " (*H.*) *scalaris* " | ,, | " *F.* (*H.*) *scalaris* " |
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| ,, | 126 | ,, | 38 | ,, | " Pillers (A.W.U.) " | ,, | " Pillers (A.W.N.) " |
| ,, | 158 | ,, | 36 | ,, | " *Pediculis* " | ,, | " *Pediculus* " |
| ,, | 166 | ,, | 8 | ,, | " *M. marginale* " | ,, | " *A. marginale* " |
| ,, | 202 | lines | 27<br>30, 33,<br>41. | ,, | " Recurrent Fever " | ,, | " Typhus " |

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## SERIES B.

VOL. VIII.] [1920.

MACHADO (O. M.). **Epidemia de Impaludismo na Usina Esther e Cosmopolis e sua Prophylaxia.** —*Serviço Sanit. Estado de São Paulo* [*Brazil*], N. S. no. 7, October 1919, 50 pp., 23 figs., 1 map.

An account is given of a severe epidemic of malaria that occurred in 1917 in the State of S. Paulo. Of 1,400 persons on one estate, 1,300 were affected and 17 deaths occurred. The use of quinine and the clearing of the neighbouring streams and their banks were the measures adopted. They are fully described and proved entirely successful, no fresh cases having occurred during a period of 15 months.

STURTEVANT (A. H.). **Flies of the Genus *Drosophila* as possible Disease Carriers.**—*Jl. Parasitology, Urbana, Ill.*, v, no. 2, December 1918, pp. 84–85.

Observations are recorded upon certain species of *Drosophila*, which are of some importance as possible carriers of typhoid or other diseases. All are known to feed more or less upon human excrement. *D. melanogaster*, Meig. (*ampelophila*, Lw.) is a cosmopolitan species, which, although it has been recorded as an excrement fly, is considered by the author to infest chiefly decayed fruit and to be of little or no importance as a disease carrier. *D. caribbea*, Sturt., which is common throughout the American tropics, has very similar habits to *D. melanogaster*, but is much more frequently attracted to excrement. *D. buscki*, Coq., and *D. funebris*, F., while probably breeding in excrement, are not likely to be important as disease carriers, as they are not common near food. The former also breeds in badly decayed potatoes and other foodstuffs. *D. repleta*, Will., is commonest near houses, where it is attracted to various organic substances and is frequently found resting on a white surface. It is easily collected about latrines and also in kitchens and restaurants. *D. repleta* has a wide range of breeding habits. It breeds in banana, pineapple, tomato and other fruits, in decayed potato, flour paste, moist bran, and similar substances, and although it has not been bred from excrement it undoubtedly feeds upon it.

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Hughens (H. V.). **A Useful and inexpensive Fly-trap.**—*U.S. Naval Med. Bull., Washington, D.C.*, xiii, no. 1, January 1919, pp. 80–82, 5 figs.

The trap here described is composed of 4 vertical sides of solid wood with a flat top of wire gauze and a gauze bottom raised to a ridge roof-wise. This ridge is about mid-way between the top and bottom of the box. Along the ridge ¼-inch holes were made to permit the flies to enter the trap-space above it. The lower edges of the box are cut away except at the corners, so that bait may be placed under the box beneath the ridge, and the flies enter through these openings. The trap stands on a wooden platform to which it is bolted at the corners. This apparatus is said to be both efficacious and cheap.

Friedman (G. A.). **The Possible Spread of Influenza through the Bed-bug.**—*Med. Record, New York*, xcv, no. 1, 4th January 1919, pp. 14–18.

Attention is drawn to the bed-bug as a possible carrier of influenza and a number of cases are mentioned in support of this theory

Rahmet Bey (H. T. M. K.). **Typhus Fever.**—*Med. Record, New York*, xcv, no. 2, 11th January 1919, pp. 49–52.

This paper deals with typhus in general with special reference to its incidence in Egypt. The usual prophylactic measures against lice and some of the recognised insecticides used in this connection are discussed.

D'Ormea (G.). **Sull'Uso della Pomata al Timolo come Misura culicifuga per le Truppe in Servizio in Localitá malariche.** [Thymol Ointment as a Culicifuge for Troops in Malarial Localities.]—*Giorn. Med. Milit., Rome*, lxvii, 1919, no. 2, 1st February 1919, pp. 296–300.

As a result of the success attending the use of vaseline containing 1 per cent. of thymol in preventing mosquitos from biting indoors, experiments have been made in the open and these have also proved very encouraging.

Tejera (E.). **El Agente Transmisor de la Fiebre Recurrente en Venezuela.**—*Gaceta Med. de Caracas*, xxvi, no. 7, 15th April 1919, pp. 73–75.

Recurrent fever occurs in the Venezuelan State of Trujillo, where the ticks, *Ornithodorus turicata* and *Argas persicus*, are common. The former is capable of producing spirochaetosis, the parasite concerned being morphologically identical with that found in the blood of sufferers from recurrent fever, and this tick is therefore a probable vector of human spirochaetosis in Venezuela.

de Almeida Junior (T.). **Myiasis cavitaria e seu Tratamento.** [Internal Myiasis and its Treatment.]—*Archivos Brasileiros de Med., Rio de Janeiro,* ix, no. 6, June 1919, pp. 496–503, 1 fig.

Several cases of internal myiasis, chiefly in the nasal cavities, due to infestation by *Cochliomyia* (*Chrysomyia*) *macellaria* (screw-worm fly) are described. The larvae were successfully expelled by applying a continuous current of electricity or by inhalations of chloroform.

Héderer (C.) & Sellier (M.). **Sur un Appareil nouveau à Sulfuration pour Désinsectisation et Désinfection.** —*Arch. Méd. Pharm. Navales, Paris,* cviii, no. 2, August 1919, pp. 118–123, 1 fig.

In this portable apparatus, invented by Surgeon-Major Lochon, the rapid combustion of a large quantity of sulphur is attained by very simple means. Usually only 20–25 grms. of sulphur per cubic metre can be burned in a room or other closed space, as the gas $SO_2$ does not support combustion. With the Lochon burner 100–120 grms. per cubic metre are vaporised in about half an hour. This is due to the strong draught resulting from the arrangement of combustion trays one over the other and to the use of an oxidising powder of which 6 parts by weight are used per 100 of sulphur. When burning, this powder produces oxygen which partly combines with the sulphurous anhydride ($SO_2$) and thus produces sulphuric anhydride ($SO_3$) to the amount of 0·4 per cent. of the total gases emitted. The mixture of $SO_2$ and $SO_3$ has a very powerful microbicide and parasiticide action and does not produce the deterioration and discolouration that $SO_2$ alone may give rise to. The apparatus can also be used for vaporising formol. It is fully described and illustrated, and notes on working are given. All insects were killed in half an hour by burning 50 grms. of sulphur and 3 grms. of oxidising powder per cubic metre of space.

Sergent (Ed.). **Rapport sur le Fonctionnement de l'Institut Pasteur d'Algérie en 1918.**—*Algiers* [n.d.], 20 pp. [Received 4th November 1919.]

This report includes an account of the antimalarial work that has been carried out during 1918. In view of the work done by the antimalarial service of Algiers during the past sixteen years a resolution has been passed by the Chamber of Agriculture of Constantine to augment the finances of the service so that antimalarial measures in the interests of agriculture may be facilitated.

Bacot (A. W.). **The Fleas found on Rats and their Relation to Plague.** —*Jl. R. Sanit. Inst., London,* xl, no. 1, 1919, pp. 53–60. [Received 4th November 1919.]

Not including the Sarcopsyllids, there are about 34 species of fleas belonging to 15 genera that have been found on rats, although other animals are in some cases their normal hosts. A list of these species is given together with their normal hosts and the countries in which they occur. Of these *Xenopsylla cheopis*, *Ceratophyllus fasciatus*, *Pygiopsylla ahalae*, *Hoplopsyllus anomalus*, *Leptopsylla musculi*, *Ctenocephalus canis* and *Pulex irritans* are known to bite man and are proved carriers of disease. *Ceratophyllus ainsus* and *Ctenophthalmus agyrtes* are proved carriers, but are not known to bite man; whilst *Ceratophyllus acutus*, *Spilopsyllus cuniculi* and *Ctenocephalus felis*, although known to bite man, have not been known to spread disease. A separate list is given of fleas found on rats in Britain, and the method of transmission of plague by fleas is discussed [*R.A.E.*, B. ii, 60].

BACOT (A. W.). **Lice: The Diseases carried by them and the Measures available for the Protection of Children and Civilians.**—*School Hygiene, London*, March 1919, Separate 16 pp. [Received 4th November 1919.]

Popular information on the habits and life-histories of lice and the effects of their bites is given, and preventive measures as well as the usual methods for the destruction of the species parasitic upon man are discussed. Those dealt with include *Pediculus capitis* (head louse), *P. humanus* (*corporis*) (body or clothes louse) and *Phthirus pubis* (crab louse). The diseases conveyed by lice are also reviewed.

BACOT (A. W.). **Danger of Disease through Lice; how to avoid it.**—*L.C.C. Education Committee*, London, May 1919, 8 pp., 1 fig.

This leaflet is intended for the use of all those whose duty it is to look after the health and welfare of children.

TAYLOR (J. F.). **The Rôle of the Fly as a Carrier of Bacillary Dysentery in the Salonica Command.**—*Med. Research Committee Nat. Health Insurance, London*, Spec. Rept. Ser. 40, 1919, pp. 68–83, 2 charts, 1 fig.

Two years' experience of the Salonica Command has shown that, while bacillary dysentery occurred to some extent among the troops throughout the warmer months, it assumed greater prevalence during the periods from spring to early summer and from late summer to early autumn, *i.e.*, at the periods when flies were most numerous. Investigations are described that show that flies are a definite factor in the incidence of bacillary dysentery. Observations were begun in March and ended in November on the incidence of flies compared with the prevalence of disease in the same area. Two hospitals were situated in this area and by means of fly-traps the average number of flies caught per diem was estimated, and is shown in a chart. The temperature and humidity curves during the period are also shown. The method of calculating the incidence of dysentery is described and the observations recorded on a chart, from which the fact is established that the incidence of dysentery corresponds to the prevalence of flies.

In a series of experiments flies were fed on material known to contain Flexner or Shiga bacilli and were subsequently examined after varying intervals with a view to the recovery of these organisms from them. The method of feeding and the cages used are described; the method adopted was to allow the flies to walk about naturally over a plate containing a medium, followed by examination of the faeces and of the legs. The results establish the fact that flies are capable of carrying both types of bacillus together with faecal organisms. The prospect of recovering the infecting organism from the fly diminishes very markedly at and after 24 hours from the time of infection, and the most suitable method of recovery after that time is from an examination of the faeces. After 24 hours, aberrant forms of dysentery bacilli are recovered. It is suggested that special attention should be directed to these abnormal findings.

From an examination of flies trapped in hospitals it was found that those living under natural conditions also showed a small percentage carrying dysentery bacilli.

PILLERS (A.W.N). **On the Occurrence of *Thrips* sp. in Skin Scrapings of Horses.**—*Vet. Jl., London*, lxxv, no 10, October 1919, pp 124–125, 1 fig.

A thrips, probably *Limothrips* (*Thrips*) *cerealium*, is recorded in equine skin scrapings. This species is common in the summer on growing grain, and is thus likely to be found in the sweat or exudations of the diseased skin of horses in the proximity of ripening corn.

WRIGHT (E. Hasell). **Report of the Prevalence of Malaria and Anopheline Mosquitoes and Measures recommended for the Prevention of Malaria in Mercara.**—*Indian Med. Gaz., Calcutta*, liv, no. 10, October 1919, pp 361–365, 1 map.

Investigations have been made in the Mercara district with a view to the reduction of malaria, the splenic index in that locality ranging from 23·71 to 54 per cent. The mosquitos bred from collected material include *Anopheles rossi*, *A. jamesi*, *A. maculipalpis*, *A. barbirostris* and *A. maculatus*. The chief carriers appear to be *A. maculatus* and *A. maculipalpis*. The general character of the country is described. The remedies advocated include improved drainage, the recovery of swamp land and the use of prophylactic and educational preventive measures.

HERMS (W. B.). **Occurrence of Malaria and Anopheline Mosquitoes in Northern California.**—*Cal. State Bd. Health, Mthly. Bull. Sacramento*, xv, no. 1, July 1919, pp. 1–9, 7 figs. [Received 11th November 1919.]

This paper has been noticed elsewhere [*R.A.E.*, B. vii, 163].

KEHOE (D.). **Anthrax in South Africa.**—*Union S. Africa Dept. Agric., 5th and 6th Repts. Direc. Vet. Research, April 1918, Pretoria*, 1919, pp. 211–253. [Received 13th November 1919.]

In the course of this study of anthrax, it is remarked that many cattle owners in South Africa express the belief that the disease is largely spread among their herds by the agency of Hippoboscids or horse-flies (Tabanids). In the outbreak of 1918, which occurred during the relatively dry period of the year, deaths among cattle and sheep were rare, although these animals grazed upon the same farms where equines were affected. Horses, mules and donkeys were the animals most frequently attacked, mortality among them continuing on many farms where vaccination was carried out. Whether the theory that the disease is carried by Hippoboscids can be supported by direct experimental evidence remains to be proved. Observations in other countries indicate the possibility of flies being vectors of the disease [*R.A.E.*, B., ii, 73, 169 ; vi, 181], and it is suggested that further investigations should be made regarding its local and seasonal prevalence and its relation to climatic and other conditions favouring the insects concerned.

MITCHELL (D. T.). **The Effects of Arsenite of Soda Dipping Fluids on Working Oxen.**—*Union S. Africa Dept. Agric., 5th and 6th Repts. Direc. Vet. Research, April 1918, Pretoria,* 1919, pp. 553–591. [Received 13th November 1919.]

The regular dipping of cattle in sodium arsenite solutions, which has become general throughout South Africa, is found to produce a detrimental effect upon working oxen. The absorption of the solution through the skin causes considerable interruption with the respiratory mechanism, giving rise to laboured breathing and profuse sweating when the animals are put to strenuous work. It has been noticed that animals that have been dipped regularly when young acquire a certain tolerance, which becomes more pronounced as they grow older. Climatic conditions also exert a marked influence, hot, windless days producing the most detrimental effect. The most marked symptoms occur a day or two after dipping has taken place.

A number of experiments were undertaken, which are described. These show that, given a tank with a sufficiently long swim and dipping at five-day intervals, it is possible to prevent tick infestation with a dipping fluid containing only ·128 per cent. arsenic, instead of the standard ·16, and that this is the maximum strength that can be used on oxen without producing a degree of respiratory distress incompatible with good work.

GREEN (H. H.). **Isolation and Description of a Bacterium causing Oxidation of Arsenite to Arsenate in Cattle Dipping Baths.**—*Union S. Africa Dept. Agric., 5th and 6th Repts. Direc. Vet. Research, April 1918, Pretoria,* 1919, pp. 595–610. [Received 13th November 1919.]

An apparently new organism, *Bacterium arsenoxydans*, has been isolated from the cattle-dipping tank at Onderstepoort. It is the causal agent of deterioration in arsenical dips and appears to be the only one to which rapid oxidation is to be ascribed. The same organism has been detected in mixed cattle and horse faeces. Its characteristics are largely negative ; it is differentiated from most of the commoner organisms by its high tolerance for arsenite. Oxidation proceeds slowly in concentrations as high as 0·8 per cent., the rate of oxidation under suitable conditions increasing as the concentration of arsenite decreases. A faintly alkaline medium produces most rapid oxidation, while slight acidity inhibits the process. Although the organism does not grow under anaerobic conditions in bouillon, growth readily occurs in the presence of nitrate.

GREEN (H. H.). **Description of a Bacterium, isolated from a Cattle Dipping Tank, which reduces Arsenate to Arsenite.**—*Union S. Africa Dept. Agric., 5th and 6th Repts. Direc. Vet. Research, April 1918, Pretoria,* 1919, pp. 611–624. [Received 13th November 1919.]

An organism that rapidly reduces sodium arsenate to sodium arsenite, and the source of which is probably faecal, has been isolated from an arsenical dipping tank. It is provisionally named *Bacterium arsenreducens,* and counteracts the oxidation brought about by *B. arsenoxydans* [see preceding paper]. While anaerobic conditions reduce the activity of this organism; free aeration accelerates its growth, and in suitable media, complete reduction of 0·2 per cent. arsenate can occur in 48 hours in any depth of layer. In mixed cultures containing the oxidising organism either arsenate or arsenite can be produced at will by varying the composition of the medium. Upon addition of glycerine, glucose, or fresh stable manure, the reducing organism out-numbers the oxidising organism and reduction occurs.

The significance of this in relation to dipping tanks in the field is discussed. The organism is non-pathogenic for rabbits and guinea-pigs, and probably also for man.

BEDFORD (G. A. H.). **Notes on the Species of *Gastrophilus* found in South Africa.**—*Union S. Africa Dept. Agric., 5th and 6th Repts. Direc. Vet. Research, April 1918, Pretoria,* 1919, pp. 627–642, 17 figs. [Received 13th November 1919.]

Of the three species of *Gastrophilus* found parasitic upon horses, mules and donkeys in South Africa, *G. intestinalis,* DeG. (*equi,* Clark) is the commonest ; *G. pecorum,* F., and *G. nasalis,* L., also occur abundantly, probably on account of the dryness of the climate. The only other Oestrid that has been found parasitic upon horses in South Africa is a nasal fly, probably belonging to the genus *Rhinoestrus,* and this is very rare. In ex-German East Africa and in the Sudan *G. asininus,* Brauer, has been recorded, but this is probably only a variety of *G. intestinalis.* Tables are given distinguishing these species both in the adult and larval forms, and descriptions are given of the stages and life-histories of the three S. African species. These keys include *G. haemorrhoidalis,* L., which has not at present been found in South Africa, but is liable to be imported at any time in horses from Europe or America.

*G. intestinalis* is found in the stomach of practically all horses examined after death, and in many donkeys and mules. Dogs are occasionally infested, but this is probably not a normal occurrence as it is doubtful whether these larvae can live for any length of time in the stomach of a carnivorous animal. In such cases the larvae are probably ingested with horse droppings. The egg-stage of this species is apparently from 7 to 13 days, which is a shorter period than that required in North America. The adults are abundant from February to April.

*G. pecorum* was very common at Onderstepoort in 1913 and again in 1916 during the same season. The larvae occur in the stomach, pharynx and oesophagus of horses. The adults appear from February to April. *G. nasalis* occurs in the duodenum of the horse. In Natal the adult flies are found from October to February, while in the Transvaal they occur from December to early May.

The effects of these larvae upon their hosts are described. It is considered that the injurious effects that have been ascribed to them have often been highly exaggerated.

de Kock (G. v. d. W.). **Notes on the Intoxication by *Gastrophilus* Larvae.**—*Union of S. Africa Dept., Agric., 5th and 6th Repts. Direc. Vet. Research, April 1918, Pretoria,* 1919, pp. 651–692, 2 charts. [Received 13th November 1919.]

Experiments described in this paper prove that *Gastrophilus* larvae contain a toxin that produces definite symptoms of intoxication when injected into horses, mules, donkeys, sheep and goats, the horse being apparently the most susceptible animal [*R.A.E.*, B. v, 185; vi, 44]. Cattle, dogs, rabbits and guinea-pigs appear to be immune to this intoxication. In view of the present knowledge of anaphylaxis there does not seem to be sufficient evidence to explain the symptoms on these lines. There is apparently no relative difference in the toxicity of the extracts made from *G. nasalis*, *G. equi* and *G. pecorum.*

The second part of this paper was written with the object of disproving the theory that pernicious anaemia in horses is directly caused by *Gastrophilus* larvae. The conclusions arrived at from the experiments described are that watery extracts of *Gastrophilus* larvae taken from horses that had died of pernicious anaemia can produce the disease when injected into susceptible horses; but such extracts taken from horses that have died from other causes cannot produce pernicious anaemia. Horse-sickness can be transmitted in a similar manner from horses that have died of horse-sickness, by injections of watery extracts of *Gastrophilus* larvae, but not of filtrates.

In an addendum, the reasons given by MM. Seyderhelm for concluding that *Gastrophilus* larvae are the actual cause of pernicious anaemia in horses are given [*R.A.E.*, B. vi, 209 and vii, 28]. The author of the present paper differs from that conclusion since the disease was not produced in any of the horses treated by him with injections of the larvae of *Gastrophilus* except when taken from horses dead from the disease. Their findings that the mortality of pernicious anaemia in horses is 100 per cent. also differs from the author's experience in which it ranges from 60 to 80 per cent.

It is considered that MM. Seyderhelm have failed to prove that they were successful in effecting recovery by their treatment of removing *Gastrophilus* larvae from the stomach of the horse, and it is pointed out that a number of horses recover, clinically, without any treatment.

Theiler (Sir A.). **A New Nematode in Fowls, having a Termite as an Intermediary Host (*Filaria gallinarum*, nova species).**—*Union of S. Africa Dept. Agric., 5th and 6th Repts. Direc. Vet. Research. April 1918, Pretoria,* 1919, pp. 697–706, 1 plate. [Received 13th November 1919.]

*Filaria gallinarum*, sp. n., which is here described, was discovered in the larval stage in the abdomen of workers of a termite, *Hodotermes pretoriensis.* Investigation showed that this Nematode completes its development in fowls, which are in the habit of feeding upon termites, and adults were reared experimentally in clean fowls fed with infected termites. It is supposed that the termites, of which only workers have been found infested, swallow the eggs, which hatch within the body, the larva finding its way to the coelomic cavity. It has not been definitely ascertained whether there are three or four larval stages in the evolution of this *Filaria*, the probable number being four, and it seems to be beyond doubt that the second ecdysis takes place in the fowl.

BEDFORD (G. A. H.). **Anoplura from South African Hosts.**—*Union of S. Africa Dept. Agric., 5th and 6th Repts. Direc. Vet. Research, April 1918, Pretoria,* 1919, pp. 711–731, 4 plates. [Received 13th November 1919.]

The Anoplura listed from material in the laboratory collection and in the Transvaal Museum include the majority of the species that are likely to be found on domestic birds and animals in South Africa. New species include :—Haematopinids, *Polyplax waterstoni*, on two species of rat ; *P. arvicanthis*, on the striped mouse, *Arvicanthis pumilio* ; Menoponids, *Colpocephalum harrisoni*, on a bustard (*Otis* sp.) in Angola ; *Pseudomenopon rostratula*, on *Rostratula capensis* (painted snipe) ; Trichodectids, *Trichodectes caffra*, on a bush cat (*Felis caffra*), and *T. genetta*, on a genet (*Genetta ludia*).

BEDFORD (G. A. H.). **New Culicine Larvae from the Transvaal.**—*Union of S. Africa Dept. Agric., 5th and 6th Repts. Direc. Vet. Research, April* 1918, *Pretoria,* 1919, pp. 739–743, 5 plates. [Received 13th November, 1919.]

Descriptions are given of the larvae of the following mosquitos :—*Mucidus scatophagoides*, Theo., found in a rain-water pool and probably predaceous upon other larvae ; *Ochlerotatus hirsutus*, Theo., found in the summer months in rain pools, hoof-holes, etc., in roads ; *O. argenteopunctatus*, Theo., found in pools along a river bank in the summer months ; *Culex tipuliformis*, Theo., taken from streams ; and *C. salisburiensis*, Theo., taken in pools and occasionally in streams. Larvae of *Culex decens* are recorded from a coal mine in the Transvaal where they were found at a depth of 300 ft. below the ground level.

SENIOR-WHITE (R.). *Toxorhynchites minimus* **(Theob.)**—*Spolia Zeylanica, Colombo,* xi, no. 41, October 1919, pp. 189–191.

From female examples taken in April and March 1919 around *Lantana* scrub in Ceylon, it is obvious that *Toxorhynchites minimus*, Theo., belongs to this genus and not to *Megarhinus* in which it was originally placed.

LAWSON (G. H. Junr.). **Cattle Lice and their Control.**—*Agric. Expt. Sta., Storrs, Connecticut,* Bull. 97, November 1918, pp. 397–414, 9 figs. [Received 13th November 1919.]

The life-histories of *Haematopinus eurysternus*, Nitzsch (short-nosed cattle louse), *Linognathus* (*H.*) *vituli*, L. (long-nosed cattle louse) and *Trichodectes scalaris*, Nitzsch (little red cattle louse), are described [*R.A.E.*, B. v, 168].

Many substances were tested against these parasites ; raw linseed oil proved the most effective and will not cause injury, provided that the animals treated are sheltered from the sun for at least 12 hours afterwards. The oil is best applied by means of a brush, but the skin should not be rubbed too vigorously nor the animals exercised. Fumigation is not advocated, as it apparently causes a certain amount of nerve strain on cows and a slight falling off of the milk yield for a few days after treatment. Although fumigation killed nearly all the sucking lice after 30 minutes, it did not affect biting lice.

BYAM (Major W.), Captains CARROLL (J. H.), CHURCHILL (J. H.), DIMOND (L.), SORAPURE (V. E.), WILSON (R. M.) & LLOYD (Ll.). **Trench Fever—a Louse-borne Disease.**—*London*, Henry Frowde and Hodder & Stoughton, 1919, xvi + 196 pp., 1 plate, 6 figs., 1 map, numerous charts. Price 10*s*. 6*d*. net.

This volume contains in extended form the information given in a paper already abstracted [*R.A.E.*, B, vi, 225], but prognosis, treatment and prophylaxis are more fully dealt with. New matter includes chapters on immunity and pathology, and a number of appendices, including a summary of the Report of the American Red Cross Research Committee [*R.A.E.*, B, vi, 236] by Lieut. R. H. Vercoe, and a copious index.

DUKE (H. L.). **An Enquiry into the Relations of** *Glossina morsitans* **and Ungulate Game, with special Reference to Rinderpest.**—*Bull. Entom. Research, London*, x, no. 1, November 1919, pp. 7–20, 2 charts.

The opinion is held by many that the great rinderpest epidemic in Africa of the 'nineties resulted in a marked decrease in *Glossina morsitans* in the fly areas through which the disease passed, amounting, in some districts at least, to the immediate or eventual disappearance of the fly, owing, it is thought, to the death of much of the wild game upon which it depended for food. In this paper the evidence bearing on the interrelation of game, fly and rinderpest is considered and is discussed with the aid of personal experience and observation. In no instance has prolonged existence of *G. morsitans* been discovered in an area where game is entirely and permanently absent. The fly is generally found associated with game in considerable numbers and variety, though it may occur in localities where wild ungulates are apparently scarce. The theory regarding buffalo as essential to the subsistence of the fly has been found untenable.

Rinderpest was found to affect some species of game very severely, while leaving others almost untouched. During the rinderpest epidemic of the 'nineties the tsetse of South Africa were affected differently in different localities. They were either apparently unaffected, markedly reduced in numbers temporarily or permanently, or reduced to the point of ultimate extinction. Generally, however, the passage of rinderpest throughout the fly country was marked by a great diminution in the numbers of tsetse. Experiments described in this paper were undertaken to determine whether rinderpest blood, *per se*, is or is not destructive to *Glossina*; it was found to have no apparent effect upon *G. palpalis*, the only species, unfortunately, on which it was found practicable to conduct these experiments.

The principle has been established almost beyond doubt, at least in the case of *G. morsitans* in the Masindi fly belt in Uganda, that the percentage of females among active flies caught is a direct index to the abundance of food animals [*R.A.E.*, B, i, 227]. The rinderpest in this region reduced the food supply of the tsetse just at the season when food is most difficult to find under ordinary conditions. The drought, beginning in November, led to an early drying of the grass and commencement of the bush fires, and the intensity and prolongation of the drought led to an unusually complete burning of the bush, and to the consequent destruction of many shelters and breeding grounds. The author considers that these phenomena afford a reasonable and probable explanation of the remarkable diminution in tsetse in the Masindi fly belt.

Rinderpest broke out in the north-east Transvaal in June 1896, when the grass is at its highest and game most difficult to find. What the exact climatic conditions were in that year is not known, but the author considers it most probable that the arrival of the disease in the cold weather, together with a prolonged dry season and consequent burning of the grass over large areas, markedly reduced the numbers of flies between June 1896 and April 1897.

The practical outcome of these observations is that *G. morsitans* should be attacked during the dry season. Destruction of the primary centres or foci should be attempted by filling in or drainage of the water supply, by destruction of the game in the vicinity, and by burning the grass at the most suitable time. Bush burning should be carefully controlled to obtain the maximum effect; indiscriminate burning by natives should be stopped and the fires started and maintained in a systematic manner.

INGRAM (A.). **The Domestic Breeding Mosquitos of the Northern Territories of the Gold Coast.**—*Bull. Entom. Research, London*, x, part 1, November 1919, pp. 47–58, 1 map.

Very little is known with regard to the distribution in the Northern Territories of the smaller blood-sucking insects such as mosquitos and sandflies. During recent investigations *Stegomyia fasciata* was found practically throughout the district traversed.

Among the larvae collected from 42 villages, in 77 per cent., *S. fasciata*, F., was found, usually in clean water; in 79 per cent., *Culex duttoni*, Theo., which was only once found in a pool at any distance from human habitations and in this case the pool had been used by natives for washing their pots; in 52 per cent., *C. decens*, Theo., generally found in foul water and often associated with *C. duttoni*, *C. tigripes* and *Culiciomyia nebulosa*, Theo., of which the last two were both found in 47 per cent. of the villages; *C. decens* was also occasionally associated with *S. fasciata*; in 45 per cent., *S. vittata*, Big., which is not solely a domestic breeder, as it was also found in pools formed by the weathering of outcrops of gneiss and laterite far from human habitations; in 9 per cent., *Anopheles costalis*, Lw.; and in 6·8 per cent. *Culex invidiosus*, Theo., chiefly found in swampy pools and only rarely in collections of water in native compounds. Larvae of *C. ager* var. *ethiopicus*, Edw., were only taken in swamp pools, and those of *Anopheles pretoriensis*, Theo., in rock pools in association with *Stegomyia vittata*, Big. (*sugens*, Theo.).

It is doubtful whether *Stegomyia fasciata* and other species of this genus tide over the dry season in the Northern Territories by means of eggs stranded in holes in trees. Owing to the absence of *Culex fatigans* and the reported prevalence of filariasis due to *Filaria bancrofti* some other species must be responsible for the transmission of this parasite.

*Phlebotomus* was found on the walls of most of the rest houses. The washing of these with an extract of a native tree (*Parkia biglobosa*) probably reduces what would seem ideal breeding places for these insects. *Culicoides grahami*, Aust., is rare in the Northern Territories, but it is apparently replaced by a larger species, *Forcipomyia ingrami*, Cart.

Attention is drawn to the greater prevalence of *S. fasciata* during and shortly after the close of the wet season and to the fact of yellow fever occurring amongst Europeans between July and the end of November, chiefly between September and November.

A list of the blood-sucking insects taken in the Gold Coast Colony, Ashanti and the Northern Territories is appended.

INGRAM (A.) & MACFIE (J. W. S.). **The Early Stages of West African Mosquitos.–iv.** -*Bull. Entom. Research, London.* x, part 1, November 1919, pp. 59–69, 7 figs.

This paper, which is supplementary to previous ones on the same subject [*R.A.E.*, B., vi, 38], describes the larval and pupal stages of the following species taken in the Gold Coast :—*Anopheles pretoriensis*, Theo., captured in shallow pools in outcrops of quartzite, in association with larvae of *Stegomyia vittata*, Big. ; *A. rufipes*, Gorgh, in clear pools in the dry bed of a stream, with pupae of *A. funestus* ; *Ochlerotatus hirsutus*, Theo., in rain-water collected in an old tin among vegetation ; *O. nigeriensis*, Theo., in a borrow-pit containing muddy water ; *Culex ager*, Giles, var. *ethiopicus*, Edw., found during June and July in swamps or pools containing algae ; *C. quasigelidus*, Theo., and *C. univittatus*, Theo., taken in a grass-grown pool of clear water.

JACK (R. W.). **Tsetse Fly in Southern Rhodesia, 1918.**—*Bull. Entom. Research, London*, x, part 1, November 1919, pp. 71–90, 3 plates, 3 maps.

The history and present situation of *Glossina morsitans* in Southern Rhodesia with special reference to its relation to big game and the breeding haunts is reviewed [*R.A.E.*, B, ii, 95, iii, 7, iv, 117, v, 166, vii, 9, 36 and 42]. All data collected tend to confirm the dependence of this species on the presence of wild ungulates ; at least there is every reason to believe that the pest feeds upon them by preference and thrives best in their presence.

With regard to the explanation of fly-belts, observations show that the dispersing range does not exceed two or three miles, but there is no apparent reason for this limited migration unless it be a definite instinct to avoid wandering. The males may be carried in any direction up to ten miles and more by the movements of animals and human beings, but there is a marked tendency to return to their place of origin. In accordance with accumulated evidence it is tentatively suggested that the manner in which fly-belts extend is analogous to that of a rising flood and not in the form of disconnected offshoots at a distance from the main belt, and should the line of advance be interrupted in regard to permanent shade, as in crossing a watershed, the movement is confined to the wet season. The presence of larger mammals in considerable quantities and a large number of flies at the previous dry season limit are essential for the crossing of a moderately wide region affording only summer shade.

Should these deductions prove correct the advance of the fly might be checked by the clearing of a comparatively narrow strip of forest. Experiments of this nature have been commenced in Southern Rhodesia but have unavoidably been abandoned temporarily.

Though direct experimental proof is still lacking, the evidence that *Trypanosoma pecorum* is commonly spread among domestic animals in the absence of *Glossina* has further accumulated.

MacGregor (M. E.). **On the Occurrence of *Stegomyia fasciata* in a Hole in a Beech Tree in Epping Forest.**—*Bull. Entom. Research, London*, x, part 1, November 1919, p. 91.

Mosquito larvae recently collected from a beech tree hole in Epping Forest include: *Anopheles plumbeus, Ochlerotatus geniculatus, Orthopodomyia albionensis* and *Stegomyia fasciata.* The last-named is recorded for the first time under natural conditions in England and attention is drawn to the possibility of this species being indigenous, as it occurred at a distance from human habitations.

**Sheep-Fly Investigation in New South Wales.**—*Science and Industry, Melbourne*, i, no. 5, September 1919, p. 269.

The field work in connection with the sheep-fly investigations is to be resumed in New South Wales on demonstrational lines. An area of 10,000 acres is to be marked off in sections for this work, which will include the liberation of Chalcid parasites [*Nasonia brevicornis*] and demonstrations as to the efficacy of this means of control when used in conjunction with fly-traps and the destruction of breeding-places such as dead animals.

Hewitt (C. G.). **The Use of the Aeroplane in Entomological Work.**—*Agric. Gaz. Canada, Ottawa*, vi, no. 10, October 1919, p. 877, 1 fig.

This paper has been abstracted in *R.A.E.*, A, viii, 10.

Abbott (W. S.). **Naphthalene *vs.* Chicken Lice.**—*Jl. Econ. Entom., Concord, N. H.*, xii, no. 5, October 1919, pp. 397–402.

Experiments with naphthaline preparations as possible destroyers of *Menopon biseriatum*, Pg., *M. pallidum*, Nit., *Lipeurus heterographus*, Nit., and *Goniocotes abdominalis*, Pg., on chickens show that when used as a dust containing 5 per cent. or less of naphthaline it is useless. A powder containing 10 per cent. was very effective, but caused slight injury to the fowls. The exact extent of the injury and its duration have not yet been ascertained. Recovery was apparently complete after five or ten minutes. When 60 or 100 per cent. was thoroughly rubbed into the feathers the birds were killed, but the same strength lightly dusted over them did not cause permanent injury. Sprinkling the fowls when on the roost at night with finely powdered naphthaline may provide a very rapid and convenient means of reducing the numbers of lice, but further experiments on these lines are desirable. Naphthaline balls in the nest not only proved of no use whatever in reducing the numbers of lice on sitting or laying hens or in the nest itself, but apparently have a toxic effect on the eggs and newly hatched chickens as well as being injurious to sitting hens.

Wood (H. P.). **The depluming Mite of Chickens: its complete Eradication from a Flock by one Treatment.**—*Jl. Econ. Entom. Concord, N. H.*, xii, no. 5, October 1919, pp. 402–404.

The experiments here described show that lime-sulphur, tobacco sulphur, dry sulphur, arsenical dip, and sodium fluoride, sulphur and soap are all effective dips against the depluming mite, *Cnemidocoptes gallinae*, Raill. A dip consisting of $\frac{2}{3}$ oz. of chemically pure sodium fluoride, 2 oz. of sulphur, $\frac{1}{3}$ oz. of laundry soap and about 1 U.S. gal. of water proved a complete control for mites, as well as lice. Subsequent experiments have confirmed the efficacy of this solution.

Brues (C. T.). **The Occurrence of *Anopheles punctipennis* in Northern New England.**—*Psyche, Boston, Mass.*, xxvi, no. 5, October 1919, p. 143.

The occurrence of *Anopheles punctipennis* is recorded in northern Maine, which is apparently further north than previous records denote. The examples in question were caught far from any railway and must be considered indigenous. They were found in the region of spruce and fir forests. The northern limit of malaria, and probably of *Anopheles* also, in Europe is at 63° to 69° N. latitude, the species concerned being *A. quadrimaculatus.* The northern limit of malaria in New England is said to be about the 45th parallel, which is the latitude at which the recorded captures were made. Larvae of *Theobaldia* (*Culiseta*) *impatiens*, Wlk., and of *Culex restuans*, Theo., were also found, both being of general occurrence in the region.

**Malarial Control.**—*5th Ann. Rept. January 1st 1918—December 31st 1918, Internat. Health Bd., Rockefeller Foundation, New York*, January 1919, pp. 124–138, 7 figs. [Received 25th November 1919.]

The malaria control work of the Southern States is summarised as follows: In the average town having a thousand or more inhabitants and a reasonably high infection rate, malaria control by anti-mosquito measures is economically feasible and is, in fact, a sound business investment. In heavily infected regions where the cost of mosquito control would be prohibitive, the amount of malaria may be greatly reduced by resort to screening, to immunising quinine, or to destroying the parasites in the blood of the human carriers.

The indications would seem in fact to justify the hope that by the systematic application of these measures the malaria in a community may be held within reasonable bounds and that this result may be accomplished within limits of cost which the average community may well afford. Experience shows that the people in these communities are prepared to provide the funds for malaria control by public taxation when they have been shown by demonstration that the programme proposed will accomplish definite results which justify the expenditure. The results thus far accomplished would seem to justify continuing these field experiments until the principal procedures that have been found useful in controlling malaria have been pretty thoroughly tested separately and thus evaluated. It will then be possible to operate intelligently a combined programme in which each control measure will be given its place and will receive varying emphasis from time to time according to the local conditions which have to be met. This freedom will in turn contribute toward the object in view, namely, the highest degree of malaria control consistent with a reasonably low cost per capita.

PATTON (W. S.). **Note on the Etiology of Oriental Sore in Mesopotamia.** —*Bull. Soc. Path. Exot., Paris*, xii, no. 8, 8th October 1919, pp. 500–504.

It is recognised that much of the future success of the colonisation of Mesopotamia will depend on the control of three injurious Diptera. The house-fly, *Musca domestica*, subsp. *determinata*, Wlk., and its ally the camp-fly, *Musca humilis*, Wied. (*angustifrons*, Thomp., *euteniata*, Big.), constitute the most dangerous insect menace in the country. Ophthalmia is carried by the house-fly, bacillary dysentery and similar diseases by *M. humilis* and *M. determinata*. Both species breed all the year round and thus are particularly difficult to control.

*Tabanus pulchellus*, Lw. (*cyprianus*, Ric.), which is the commonest and most widely distributed horse-fly, and is very closely allied to *T. ditaeniatus*, Macq., and *T. glaber* are most probably the vectors of the fatal dromedary trypanosomiasis that caused the loss of hundreds, probably thousands, of these transport animals during the recent campaign. The Arab dromedary breeders who live in the deserts bordering the rivers take such careful precautions to protect their animals from the bites of these flies that their losses are negligible.

The sand-flies, *Phlebotomus papatasii* and *P. minutus*, transmit the unknown organism of sand-fly fever, and are also believed to be the carriers of the parasite of Oriental sore. On the analogy of kala-azar, which is caused by natural parasites (Herpetomonads) of insects that have adopted the blood-sucking habit in association with vertebrate hosts, the author based his observations on Oriental sore on the hypothesis that the disease is of insect origin, in the sense that the parasite is in reality some natural insect *Herpetomonas* which has become transmitted to man, in short, that the insect is the reservoir of the parasite. As the genus *Cimex* does not occur in Mesopotamia, the species of *Phlebotomus* are the most likely reservoirs of the parasite. Both species occurring there are known to be infected with *Herpetomonas phlebotomi*, Mackie. The author believes that this is a natural parasite of these midges and is transmitted through their larvae to the imagines. The flies breed in cracks and crevices in the ground and in old walls ; the adults are gregarious and their breeding-places become soiled with their excreta containing the post-flagellate stages of the parasite, thus explaining how the larvae acquire their infection. All the evidence points to the parasite of Oriental sore being acquired by rubbing *Herpetomonas phlebotomi* into the skin when an infected sand-fly is crushed while biting, and this is a frequent occurrence on all exposed surfaces of the body, which are the only parts where Oriental sore has been known to occur. The disease, although common, is definitely localised to certain camps, strongly suggesting that the infection of sand-flies with *H. phlebotomi* is also localised. An attempt was made to dissect the alimentary tracts of sand-flies, examining them in a fresh condition, selecting an infected hind-gut and rubbing this into the skin at a marked spot. Unfortunately, no infected flies could be found at the time. It is hoped that others will be able to complete the experiment, noting whether the fly has or has not previously ingested the blood of the gecko.

CRESPIN (J.) & ATHIAS (G.). **Le Paludisme à Alger. Difficultés du Diagnostic avec la Fièvre typhoïde. Cas de** *Pl. falciparum.*—*Bull. Soc. Path. Exot., Paris,* xii, no. 8, 8th October 1919, pp. 504–509.

The danger of considering any particular locality as being absolutely free from endemic malaria is pointed out. The town of Algiers has always been considered perfectly healthy from the malarial point of view, the fairly numerous cases that have occurred there having been contracted outside the town. Exceptions to this rule have, however, occurred in two individuals, whose illness was at first diagnosed as typhoid fever, but upon further examination they were found to be suffering from locally acquired malaria, neither of them having left the town of Algiers. The parasite concerned was *Plasmodium praecox* (*falciparum*).

TEJERA (E.). **La Trypanosome américaine ou Maladie de Chagas au Venezuela.**—*Bull. Soc. Path. Exot., Paris,* xii, no. 8, 8th October 1919, pp. 509–513.

The occurrence of American trypanosomiasis or Chagas disease is recorded from Venezuela, the vector undoubtedly being the bug, *Rhodnius prolixus*, Stål. Trypanosomes recovered from the blood of mice, guinea-pigs and monkeys inoculated with the virus all showed the morphological characters of *T. cruzi.* Larvae of *R. prolixus* hatched in the laboratory and fed upon infected mice all showed identical trypanosomes and were able to re-infect other animals. A systematic examination of the blood of the inhabitants of the region revealed the presence of the trypanosome in human blood. In the author's opinion the disease is not of recent introduction into Venezuela. In localities where infected individuals of *R. prolixus* are found, goitre is very prevalent, which tends to confirm Chagas' theory that goitre in Brazil is produced by *T. cruzi.* *Triatoma* (*Conorhinus*) *megista*, the vector of trypanosomiasis in Brazil, does not apparently occur in Venezuela.

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França (C.). **L'Insecte Transmetteur de *Leptomonas davidi* (Note préliminaire).**—*Bull. Soc. Path. Exot., Paris*, xii, no. 8, 8th October 1919, pp. 513–514.

The discovery is recorded of *Leptomonas davidi* in a Hemipteron, *Stenocephalus agilis*, found on spurge (*Euphorbia segetalis*). Many of the bugs were found to be parasitised by a Dipterous larva, identified by Roubaud as that of a Muscid belonging to the OCYPTERINAE or GYMNOSOMINAE, which, when parasitising an infected individual of *S. agilis*, was also found to harbour *Leptomonas*.

Van den Branden (F.). **Action de la Combinaison Atoxyl, Emétique, Tryparosan, sur le *Trypanosoma congolense*.**—*Bull. Soc. Path. Exot., Paris*, xii, no. 8, 8th October 1919, pp. 514–517.

An outbreak of trypanosomiasis is recorded among cattle at Leopoldville, following the introduction of a herd of goats from the Upper Congo. The parasite concerned was *Trypanosoma congolense* and the vector was without doubt *Stomoxys calcitrans*. An intensive treatment of atoxyl emetic and tryparosan had a beneficial effect in the case of the cattle, though it did not definitely eliminate the trypanosomes from the blood.

Bequaert (J.). **L' *Ornithodorus moubata* dans le Nord-Est du Congo Belge.**—*Bull. Soc. Path. Exot., Paris*, xii, no. 8, 8th October 1919, pp. 517–520.

Commenting upon a recent paper on the occurrence of *Ornithodorus moubata* in the Belgian Congo [*R. A. E.*, B, vii, 151] the author remarks that the impression is there conveyed that this tick has not yet appeared in Upper Ituri; as a matter of fact it has been known in that region for many years. The topographical occurrence of *O. moubata* within the region is discussed. It is pointed out that while its presence in localities outside the Equatorial Forest is readily understandable in view of its affinity for dryness, its occurrence in other localities in the depth of the forest appears at a glance to be abnormal; this is however explained by the fact that in these localities there are Negro-Arabic settlements, and large areas of the forest have been cleared. In fact the conditions are exactly similar to those prevailing in parts of the Eastern Province, and this distribution of the tick confirms Rodhain's view of it as a drought-loving species.

There is very little doubt but that this tick is indigenous to Africa, since it has never been found in any other part of the world. At first, however, it was very localised, and its present distribution is due to continual caravan travelling. In 1854, when its presence was first recorded in Angola by Livingstone, both the tick and relapsing fever were unknown in South Africa and Rhodesia. However, in the plateau of Walendu, between the basin of the Ituri and Lake Albert, the tick is commonly found in all the native villages, the natives having acquired complete immunity to the fever, although immigrants are readily affected by it. It is unlikely that such perfect immunity has been acquired within a short period, and it is the author's opinion that this region was one of the primitive indigenous centres where *O. moubata* existed before the arrival of Arabs or Europeans in Central Africa.

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Clapier (—). **Index palustre chez les Indigènes de la Commune de Bangui (Afrique Equatoriale Francaise).**—*Bull. Soc. Path. Exot., Paris,* xii, no. 8, 8th October 1919, pp. 538–549.

The geographical and climatic conditions, the population and vegetation of Bangi, the capital of the French colony of Ubangi-Shari in French Equatorial Africa, are discussed with reference to malarial prevalence. Mosquitos are not extremely abundant in the region, and are becoming less numerous with better conditions of drainage and clearing of the land. During the dry season of 1918, while a few Culicines were found, including species of *Culex, Stegomyia* and *Mansonioides,* Anophelines were much rarer and more difficult to find. In seasons of heavy rains the breeding places increase and the number of *Anopheles* is proportionately larger, the malarial incidence increasing in consequence. Permanent carriers of the virus are very numerous at Bangi and are widely distributed throughout the region. The average malarial index of the year was found to be 78 per cent. It is noticeable that in the villages similarly situated in valleys beside rivers that overflow their banks, the malarial incidence is practically the same throughout and is much higher than the average. The lowest percentage, 53 per cent., was recorded for a village situated 623 metres above the valley on a vast plateau that is provided with natural water. It has already been proposed to utilise this spot for some useful establishment under the Health Service.

Tables are given showing the malarial index and the splenic index for children. The favourable action of atoxyl upon malaria is confirmed by treatment in this region. The variations of the index according to the season is not great, being apparently never more than 15 per cent. The types of malaria parasite recorded are *Plasmodium praecox* (*falciparum*) 42·5 per cent., *P. vivax* 49·1 per cent., and *P. malariae* 8·4 per cent. No definite predominance of any form can be indicated for any particular place or season. The conclusion drawn from these observations is that most of the regions of Equatorial Africa are almost uniformly malarial.

Lignières (J.). **Piroplasmes, Anaplasmes et Grains chromatiques.**—*Bull. Soc. Path. Exot., Paris,* xii, no. 8, 8th October 1919, pp. 558–566.

This paper discusses the tendency to confusion between the parasitic organisms *Anaplasma, Piroplasma,* and certain chromatic grains recovered from cases of acute anaemia, either natural or experimentally produced. Experiments by the author in Argentina upon *Anaplasma argentinum* confirm those of Theiler and indicate that *Anaplasma* is not merely a phase in the evolution of *Piroplasma,* but is quite a distinct organism. Immunity transmitted by the former is negative for the latter and *vice-versa.* Moreover, contrary to the author's early belief [*R.A.E.*, B, ii, 172], it is now recognised that the tick, *Margaropus microplus,* which readily transmits piroplasmosis in Argentina, does not usually transmit anaplasmosis. This is an obscure point, but the agency of another tick of the genus *Amblyomma* is suspected in this connection.

Panisset (M. L.). **La Piroplasmose des Bovidés.**—*La Vie Agric. et Rur., Paris,* xv, no. 46, 15th November 1919, p. 366.

The geographical distribution of piroplasmosis in France is very little known, its occurrence being recorded mainly from Normandy and the vicinity of Maubeuge. Remedial measures advocated include the use of trypanblue in intravenous injections and the destruction of ticks by means of arsenical dips.

**Parasites externes des Volailles.**—*La Vie Agric. et Rur., Paris,* xv, no. 47, 22nd November 1919, p. 383, 2 figs.

The methods advocated for freeing poultry from parasites include treatment of the plumage with kerosene or the use of a dip consisting of potassium pentasulphide, 1 oz. to 2 pt. of water. This should be used at a temperature of about 85° F., the bird being immersed in it with the exception of the head and subsequently placed on thick bedding and sheltered from cold, draughts and the rays of the sun. Parasites attacking the eyes may be destroyed by bathing the parts with boric lotion, a 3 per cent. solution of copper sulphate or the application twice daily of drops containing 1 part by weight of silver nitrate in 400 of distilled water.

Nolan (H. O.). **Recent Work in Malaria Control.**—*Modern Medicine, Chicago, Ill.,* i, no. 7, November 1919, pp. 643–647.

This article is a review of recorded measures against malaria and contains no new information.

Mosier (C. A.) & Snyder (T. E.). **Notes on the Seasonal Activity of Tabanidae in the lower Everglades of Florida.**—*Proc. Entom. Soc. Washington, D.C.,* xxi, no. 8, November 1919, pp. 186–196, 1 plate.

It is probable that Tabanids are responsible for the pollination of the saw palmetto (*Seronoa*), as those palms on which the flies have been observed have produced an unusually heavy crop of fruit. The males of *Tabanus lugubris, T. atratus* and *T. lineola* seem to feed more after the leaves have been removed. The observations made during 1918–1919 show that *T. americanus* and *T. trijunctus* are apparently restricted to a definite season, viz.—February to June and March to April respectively, whilst other species are active throughout the year. A calendar of the seasonal activities of these flies for 1918–1919 is appended.

Forbes (J. G.). **Filarial Infection in Macedonia. Report of two Cases of *Filaria conjunctivae* (Addario) in Man with the first recorded Discovery of the Male Worm.**—*Jl. R.A.M.C., London,* xxxiii, no. 5, November 1919, pp. 363–373, 8 figs.

This paper has been noticed from another source [*R.A.E.*, B, vii, 54].

Kennedy (J. C.). **Observations on the Formation of "Buds" by the Spirochaete of Relapsing Fever in the Louse.**—*Jl. R.A.M.C., London,* xxxiii, no. 5, November 1919, pp. 407–411, 28 figs.

The knowledge of the life-history of *Spirochaeta recurrentis* in the louse is incomplete, as nothing is known of the stage of invisibility during the first four days after infection or the transmission of the virus to the offspring. The present observations were made on two lice that were dissected twenty-four and thirty hours, respectively, after being removed from a case of relapsing fever which had been ill for about 3 days. From the size and number of spirochaetes present the lice must have been infected about 10 days previously. No spirochaetes were found in the gut, but large numbers were present in the coelomic fluid and round the posterior end of the gut. Further careful examination revealed "buds" which are doubtless of spirochaetal origin and were found on any part of the spirochaete, as well as apparently detached from it; one was found in a preparation made from the ovum, but this may have been accidental. Large numbers of refractile granules were found in the coelomic fluid, in the tissues round the gut, and in the ovaries and ova, but their origin is uncertain.

Corfield (W. F.). **Some Experiments upon the Control of Fly-breeding Areas in Camps.**—*Jl. R.A.M.C., London,* xxxiii, no. 5, November 1919, pp. 415–418.

The present experiments were carried out with a view to testing the different fly deterrents and to ascertain the most successful method of sealing latrine or refuse pits. The observations here described show that if hessian or similar material is used it must stretch more than 6 inches beyond the original pit to be effective, but further experiments are necessary to ascertain the exact distance. Mud, about 6 inches thick and allowed to dry in layers is just as effective provided it extends well beyond the pit's margin. Deterrents are useless, as they only tend to drive the larvae to the sides and edges of the pit from whence the emerging fly can escape.

Bourcart (J.) & Laygier (H.). **Caractère saisonnier de l'Ictère épidémique en Macédoine.**—*C.R. Soc. Biol., Paris,* lxxxii, no. 28, 15th November 1919, pp. 1170–1171, 1 fig.

Observations made in Macedonia and Albania during 1917–1918 among French and allied troops on the seasonal occurrence of epidemic jaundice show that the first cases are usually reported towards the end of the summer and that the epidemic reaches its maximum during the autumn months and dies down during the winter. The number of cases recorded for each month is given in a chart.

França (C.). **Notes de Zoologie Médicale, Observations sur le Genre** *Phlebotomus.*—*Broteria, Braga,* Ser. Zool., xvii, no. 1–2, October 1919, pp. 102–160, 38 figs.

The first part of this paper describes the anatomy of the following species: *Phlebotomus minutus,* Rond., *P. papatasii,* Scop., *P. perniciosus,* Newst., *P. sergenti,* Parr., *P. walkeri,* Newst., and

*P. duboscqui*, Nev. Lem. (*roubaudi*, Newst.). Descriptions are given of *P. papatasii*, Scop., apparently the predominant European species; *P. sergenti*, Parrot, occurring in Algeria, Spain and Portugal; *P. perniciosus*, Newst., common in Europe and Africa and of which *P. legeri*, Mansion, and *P. lusitanicus*, França, are synonyms; *P. minutus*, Rond., from Algeria and Spain. An Italian species, *P. mascittii*, Grassi, is mentioned, but not described. There is a key to the above species and to *P. ingrami*, Newst., and *P. simillimus*, Newst., both occurring in Africa. Tables are included, drawn up by Dr. L. Parrot, of micrometric measurements of *P. sergenti*, *P. perniciosus* and *P. minutus africanus*.

The rôle played by *Phlebotomus* in disseminating diseases is reviewed. They are regarded as vectors of three-day fever, and probable transmitters of Oriental sore and of verruga in Peru. In Portugal the author has failed to find the Herpetomonad parasite discovered by Wenyon at Aleppo in 1910 and suggests that this may be a cultural form of *Leishmania tropica*. In 1914 Mackie found Herpetomonads in about 11 per cent. of the examples of *P. minutus* taken at Madras and named them *Herpetomonas phlebotomi*. According to Parrot these midges are parasitised in Algeria by Acarids.

ORR (H.). **A practical Hot Air Disinfector.**—*Parasitology, Cambridge*, xi, no. 3–4, October 1919, pp. 267–278, 5 figs.

It has been proved that both adults and eggs of *Pediculus humanus* are killed in 10 minutes when exposed to a dry atmosphere at a temperature of 50° C. and 55° C., and this method has many advantages over treatment with steam or sulphur dioxide. Many types of disinfectors have been introduced and employed since 1915; the one here described and illustrated was used throughout the British Expeditionary Forces and is easily constructed in a few days.

KEILIN (D.) & NUTTALL (G. H. F.). **Hermaphroditism and other Abnormalities in** ***Pediculus humanus*****.**—*Parasitology, Cambridge*, xi, no. 3–4, October 1919, pp. 279–328, 6 plates, 28 figs.

The differentiation of sexes in normal lice is discussed and the various abnormalities found in examining 155 hermaphrodite examples of *Pediculus humanus* are described. Laboratory experiments show that the probable cause of hermaphroditism under natural conditions is the crossing of *P. capitis* and *P. corporis*, which are considered to be only races of *P. humanus*. This cross-breeding is also always accompanied by a great decrease in the proportion of females to males. Other anatomical abnormalities of *P. humanus* are also discussed.

NUTTALL (G. H. F.). **The Systematic Position, Synonymy and Iconography of** ***Pediculus humanus*** **and** ***Phthirus pubis*****.**—*Parasitology, Cambridge*, xi, no. 3–4, October 1919, pp. 329–346.

The contents of this paper are sufficiently indicated by its title.

Graham-Smith (G. S.). **Further Observations on the Habits and Parasites of Common Flies.**—*Parasitology, Cambridge,* xi, no. 3–4, October 1919, pp. 347–384, 2 charts, 2 plates, 23 figs.

The habit of cleansing themselves exhibited by flies and the influence of weather upon them is discussed. With regard to the latter, experiments show that the curve indicating the number of flies caught corresponds with that for the maximum temperatures recorded by a thermometer exposed in the sun. The flies caught during these experiments in 1914, 1915 and 1916 included *Morellia hortorum, Graphomyia maculata, Polietes albolineata, Pyrellia eriophthalma* and *Phormia azurea* (*groenlandica*). These species were less common in 1915 than in the other years. Many species were examined for the presence of the fungus, *Empusa,* which was found to attack *Calliphora erythrocephala, Lucilia caesar, Hydrotaea dentipes, Fannia canicularis, Anthomyia radicum, Sarcophaga carnaria, Musca corvina* and *Scatophaga stercoraria.*

The natural enemies of flies include mites, the beetles, *Creophilus maxillosus, Necrophorus humator, Hister cadaverinus* and *Pterostichus madidus,* as well as numerous parasites.

The latter, which are discussed and illustrated, include Cynipids, *Diranchis* sp., *Kleidotoma* sp. and *Figites* sp., all of which emerged from the puparia, in which they had hibernated: Proctotrupids, *Trichorpia* sp.; *T. ? elongata,* Thoms.; several species of *Aneurrhynchus*; and one individual of a species of *Conostigmus* or *Lygocerus*: Ichneumonids, *Phygadeuon speculator,* Thoms., and *Atractodes bicolor,* Gravenh., obtained from puparia of *C. erythrocephala*: Chalcids, *Melittobia acasta,* Wlk., which often attacks puparia previously infested by *Alysia manducator*; *Dibrachys cavus* which oviposits in normal puparia of *M. stabulans* and *P. azurea* (*groenlandica*) as well as in puparia already parasitised by *Alysia manducator*; *Nasonia brevicornis*; *Muscidifurax raptor*; *Necremnus leucarthros,* Thoms.; *Spalangia hirta,* Hal.; and *Stenomalus muscarum,* of which the last-named although found hibernating in company with flies has not been obtained from fly puparia: Braconids, *Alysia manducator*; *Aphaereta cephalotes,* Hal.; *Aspilota fuscicornis,* Hal.; and *A. nervosa,* Hal.

Bacot (A.) & Linzell (L.). **The Incubation Period of the Eggs of** *Haematopinus asini.*—*Parasitology, Cambridge,* xi, no. 3–4, October 1919, pp. 388–392.

Of the three species of lice, *Trichodectes equi, T. pilosus* and *Haematopinus asini,* found on horses the last is the most important, as it occurs most frequently, causes greatest irritation, and apart from the general symptoms caused by its presence, is most difficult to eradicate, for apparently clean horses may become reinfested after the lapse of a few weeks. Investigations here described show that the normal incubation period is from 16 to 20 days, with a minimum under natural conditions of about 15 to 16 days. Moist cold kills the eggs, but dry cold only killed 50 per cent. at a temperature of 50° F. for a week and increased the incubation period of the remainder to 18 days. Dry heat very quickly kills the eggs. To prevent possible re-infestation by lice emerging from eggs with an abnormally lengthened incubation period four dressings at least should be applied at intervals of four days. Although no disease of horses has as yet been definitely traced to *H. asini*, there is always the possibility of it proving a carrier.

Nuttall (G. H. F.). **Observations on the Biology of the Ixodidae. Part iii, Dealing with the Behaviour of the Sexes in** ***Amblyomma hebraeum*****,** ***Hyalomma aegyptium*** **and** ***Rhipicephalus bursa*** **when upon the Host.**—*Parasitology, Cambridge*, xi, no. 3–4, October 1919, pp. 393–404.

The observations described show that the male of *Amblyomma hebraeum* remains attached to the host and is sought by the female for pairing. The females only begin to feed to any great extent after this has taken place and they drop off after from 4 to 25 days when fully gorged, whereas the male still remains on the host, only occasionally slightly changing his position, for from 77 to 141 days. In *Hyalomma aegyptium* and *Rhipicephalus bursa* the females are sought by the males, which wander over the host, on which they remain indefinitely even after the fertilised and engorged females have dropped off.

Duke (H. L.). **Tsetse Flies and Trypanosomiasis. Some Questions suggested by the later History of the Sleeping Sickness Epidemic in Uganda Protectorate.**—*Parasitology, Cambridge*, xi, no. 3–4, October 1919, pp. 415–429.

The history of the sleeping sickness epidemic in Uganda and of the suppressive measures adopted against it, as well as the subsequent criticisms of these measures, are reviewed. Both exponents and critics of these methods based their arguments on the belief that complete severance of contact with *Glossina* was necessary in the case of human as in that of bovine trypanosomiasis. That this is unnecessary is shown by the comparison drawn between bovine trypanosomiasis as transmitted by *Glossina morsitans* and sleeping sickness in man as transmitted by *G. palpalis*. Sleeping sickness may be transmitted by the direct or mechanical method or by cyclical transmission. Observations however show that only in a small percentage of *G. palpalis* is the trypanosome able to undergo cyclical development. Of the flies ingesting mammalian trypanosomes a smaller proportion of *G. palpalis* is likely to become infective than of *G. morsitans* and of such infected flies a smaller proportion is likely to transmit infection in the case of *G. palpalis* than of *G. morsitans* to man and domestic ruminants respectively. It is suggested as a plausible hypothesis that the trypanosome persisting in fly and game in Uganda at present is less virulent toward man than that responsible for the decimating epidemic of sleeping sickness. It is not uncommon in laboratory experiments to obtain a strain of trypanosomes of increased virulence and with atypical characters that is able to survive in animals that previously proved resistant to it, and there is every reason to believe that such a strain may develop in nature through repeated mechanical transmission and might probably result in an epidemic of trypanosomiasis in a vertebrate host ordinarily resistant to the normal strain of the parasite. It is possible that a peculiarly virulent strain of *T. gambiense* may have been developed in this manner, but all observations show that further specific enquiries are necessary.

KEILIN (D.). **On the Life History and Larval Anatomy of** *Melinda cognata*, **Meigen (Diptera, Calliphorinae) parasitic in the Snail,** *Helicella* (*Heliomanes*) *virgata*, **Da Costa, with an Account of the other Diptera living upon Molluscs.**—*Parasitology, Cambridge,* xi, no. 3–4, October 1919, pp. 430–455, 4 plates, 4 figs.

This paper concludes with observations made by M. E. Séguy, who noticed that the larvae of *Musca domestica* readily devour snails either living or dead, the attacked molluscs often being covered with a mite, *Eurenetes limaceum*, Schrank. From 50 molluscs collected in January, 9 yielded larvae of *M. domestica*; all stages bred from snails are however smaller than those bred from decomposed organic substances. Séguy records the presence of larvae of *Calliphora erythrocephala* and *Phora giraudi*, Egg., in snails, in addition to that of *Melinda cognata*, Meig., dealt with here.

SCHWETZ (J.). **Dix Jours d'Observations sur les Moeurs de la** *Pangonia zonata* **et de la** *Pangonia oldii* **(Deuxième Note).**—*Rev. Zool. Africaine, Brussels,* vii, no. 2, 1st October 1919, pp. 92–106.

Observations made at Kakanu, Belgian Congo, during May 1918, show that the presence of *Pangonia zonata* is closely related to the distribution of a native plant, *Acanthus montanus*; whereas *P. oldi*, although usually found in the same locality, is more abundant in the forest [*R.A.E.*, B, vii, 80]. Both species are blood-suckers, but will only bite man under special circumstances, their chief food being the nectar of flowers. In the district under consideration the flies appear towards the end of the rainy season, *i.e.*, end of April, and disappear during July.

The species in question recorded as *P. zonata* has since been identified as *P.* (*Diatomineura*) *inornata*, Aust., and that treated as *P. oldi*, although very similar to it, is probably undescribed.

VANDENBRANDEN (F.). **Observation sur des Larves de** *Lucilia* **se développant dans des Plaies.**—*Rev. Zool. Africaine, Brussels,* vii, no. 2, 1st October 1919, pp. 197–198.

A species of *Lucilia* has been observed ovipositing in wounds in rodents. The animal under observation was a rat, *Cricetomys gambianus*, the front paws of which were attacked. The eggs are deposited near the wound into which the emerging larvae make their way. Eggs were also deposited on the back of the animal. In no case were healthy rats attacked. The duration of the life-cycle of the fly from egg to the emergence of the adult is 21 days.

Lutz (A.), de Souza Araujo (H. C.) & Da Fonseca (O.). **Viajem scientifica no Rio Paraná e a Assuncion com Volta por Buenos Aires, Montevideo e Rio Grande.** [A scientific Journey on the River Paraná and to Assuncion and the Return Journey over Buenos Aires, Montevideo and Rio Grande.]—*Mem. Inst. Oswaldo Cruz, Rio de Janeiro*, x, no. 2, 1918, pp. 104–173, 108 photographic figs. [With an English Summary.] [Received 1st December 1919.]

A number of entomological notes made on this journey are given. Blood-sucking insects observed while travelling on the rivers included Tabanids, such as *Lepidoselaga lepidota*, *Diachlorus flavitaenia* and *D. bimaculata* ; these flies invade the boats even in broad daylight. *Esenbeckia* spp. also follow the rivers, but are not much in evidence in daylight. *Chelotabanus aurora*, a fluviatile species, is seen at dusk. At some distance from the shore, mosquitos are not seen on board in daytime, but at night some species, chiefly *Taeniorhynchus* (*Mansonia*) and *Anopheles* (*Cellia*). are attracted by lights. *Simulium amazonicum* is found on all the large rivers where there are falls and is most annoying on the water ; on shore horses suffer more than their riders.

*Anopheles* (*Cellia*) *argyrotarsis*, the vector of malaria on the Upper Paraná, and a few examples of *A.* (*C.*) *albimanus*, also from the river, were the Anophelines met with. *Stegomyia fasciata* occurred at Baurú and at Tres Lagoas, the first station on the Corumbá railway, along which its spread is assured. The most troublesome mosquitos met with were *Culex fatigans* (*quinquestriatus*), *C. confirmatus* (*scapularis*), *C. albofasciatus*, *Janthinosoma arribalzagae* and *Taeniorhynchus* (*Mansonia*) *titillans*. *C. fatigans* occurred nearly everywhere. *C. confirmatus* is very common on the Upper Paraná. It is not numerous on moving vessels, but when they come to the bank it invades them in company with *J. arribalzagae*. Its larvae are seldom found. This and the frequent occurrence of rubbed specimens appear to point to this species being long-lived. It is common in Paraguay and Argentina where there are trees. *C. albofasciatus* resembles the preceding species in many ways. It bites in sunlight. When attracted by artificial light it enters houses and boats in large numbers. Until recently it was only known from Argentina ; on this journey it was seen below Corrientes and—on the return journey—in the harbour of Rio Grande. The eggs obtained from captured females were laid separately and resembled those of *Stegomyia*. They sink easily, but develop even under water, though less quickly. The larvae take at least 5 days to develop. The larval stage lasts about 2 weeks and the nymphal period, a little less than 3 days. *Janthinosoma arribalzagae* was not uncommon on the Lower Paraná and in Paraguay, while on the upper river and its affluents it attacked all those who went ashore and invaded the boats. It is exclusively found on the banks of rivers in which it must breed, as there is frequently no other water. No larvae were obtained. The eggs are single, black and similar in shape to those of *Stegomyia*. In spite of repeated experiments no larvae were hatched, this probably indicating peculiar biological conditions. Some specimens were quite typical, but others seemed transitional to *J. albigena*, of which typical specimens were also found. *Taeniorhynchus titillans* was found both on the Upper and on the Lower Paraná, and it was very common on the Salado River near San Bernadino, Paraguay. A species taken on the Upper Paraná may be *T.* (*M.*) *pseudotitillans*, very common on the Amazon. On this journey few plants of *Pistia stratiotes* were seen and on those examined no larvae were found. *Psorophora ciliata* is common in Paraguay. *Culex serratus* and one specimen of *C. crinifer* were noticed at the Iguassú Falls. *Carrolia iridescens* and *Hyloconops longipalpis* were bred from the giant bamboo, *Chusquea gaudichaudi*, on the Upper Paraná; also some larvae of *Sabethinus* and *Megarhinus*. One larva of the *Dendromyia* type was taken from *Urera subpeltata*(?), the stems of which sometimes hold water.

Some small blood-sucking CERATOPOGONINAE, probably *Culicoides debilipalpis*, were found. They enter houses, especially open verandahs. *C. horticola*, Lutz, was obtained in Paraguay and *Cotocripus pusillus* probably also occurs there.

The collection of early stages of *Simulium* spp. was rendered difficult by the fact that the river was high during the journey. Schrottky has described three species, all of which attack man, from Paraguay, viz. :—*S. inexorabile*, *S. paraguayense* and *S. paranense*. Dr. Lutz considers that the first is a synonym of *S. pertinax*, Kollar, the commonest species at Rio de Janeiro. *S. pertinax* is common along the mountainous coast of Brazil, but not above 2,600 feet altitude. Inland it occurs at moderate elevations. *S. paraguayense* was found on the Paraná and at Tucuman, Argentina. No nymphs were found, probably owing to the flood, so that the presence of the large number of adults seen points to great longevity. Besides these, two other species were found, one of which, *S. amazonicum*, attacks man. The other, *S. orbitale* (so named because it prefers to bite horses at the orbital margin of the eye), was met with on the Upper Paraná. The very characteristic larvae and nymphs are generally found in all large falls. It is unusual for them to be directly attached to stones; more commonly they are found on plants, principally Podostemaceae, which only grow in falls. In its earlier stages *S. amazonicum* also lives on these plants. After Dr. Lutz's return, he received from Paraguay specimens of *S. pertinax*, *S. orbitale*, *S. paraguayense*, *S. amazonicum* and *S. subpallidum*, and *S. pertinax* and *S. rubrithorax* from Argentina. *S. subviride*, sp. n., was not rare at Mojoli; it was caught on horses. *S. incrustatum*, a rather common species, came on board between Mojoli and Tibiriça.

The only specimen of *Phlebotomus* seen on this journey was a female of *P. longipalpis* taken near Iguassú. Some examples of this species have been received from Paraguay.

Lists are given of the Tabanids found in the various regions visited or sent from there.

The report on climatogy and sanitary conditions is due to Dr. de Souza Araujo. Malaria and Chagas' disease are widely spread in the part of the State of São Paulo between Baurú and Porto Tibiriça. *Triatoma* and *Phlebotomus* are plentiful. At Tres Lagoas malaria is common, and *Triatoma sordida* is abundant. The most important flagellate met with was *Trypanosoma cruzi*, and at Assuncion some specimens of *Triatoma infestans* harboured it in large numbers. This, and the occurrence of goitre, justifies the assumption that American trypanosomiasis exists in Paraguay. It may be remembered that this disease remained unnoticed for a long time in Brazil. *Trypanosoma equinum*, infesting horses and mules, is distributed over a wide area of the territory through which the expedition passed. American leishmaniasis, locally called Baurú ulcer, and its causative agent, *Leishmania brasiliensis*, are well known in the north-west of São Paulo and in Paraguay. Tertian malaria occurred, but no cases were met with of infection with the quartan form.

ECKSTEIN (F.). **Die Ueberwinterung unserer Stechmücken.** [The Hibernation of our Mosquitos.]—*Biol. Zentralblatt, Leipzic*, xxxviii, no. 12, 23rd January 1919, pp. 530–536.

In this paper on German mosquitos [*R.A.E.*, B, vi, 211; vii, 69, 173], it is stated that the details of hibernation in Germany have not yet been fully investigated. All observers are agreed that the males perish in autumn, the eggs, larvae and adult females being the forms in which hibernation may occur. One or other of these is usual in a given species; for instance, in the case of *Culex pipiens*, it is the adult female that hibernates as a rule.

In the course of observations made at and around Strassburg during the past few years, it was found that *Anopheles maculipennis* generally hibernates in the adult stage, though it is possible that some larvae may survive the winter. The females choose a dry situation protected against wind, and do not seem to be influenced by light. They bite in February after being kept in a warm room for some time. On leaving their winter quarters they seek stables and sheds where they can obtain a feed prior to oviposition. Under normal conditions *A. bifurcatus* hibernates in the larval stage exclusively and no adults have been found in winter. The larvae were found among leaves at the bottom of subsoil-water holes or at the edges of large swamps. They were also taken from partly-frozen puddles; on one occasion the temperature of the water was 37° F. (3·5° C.). Nothing definite can be said regarding *A. plumbeus* (*nigripes*), but it probably overwinters as an adult.

Both *Culex pipiens* and *Theobaldia* (*Culiseta*) *annulata* are recorded as hibernating in the adult stage. They choose damp situations protected against wind and readily bite in January after being kept in a warm place for some time. *T.* (*Culiseta*) *glaphyroptera*, Schiner, and *Culex hortensis*, Fic. (*territans*, Wlk.) are somewhat rare species that overwinter in the adult stage. Schneider has stated that *T.* (*Culicella*) *morsitans*, Theo., does not hibernate as a larva, but the author finds the contrary to be the case, at least in the woods around Strassburg. This species appears to have one annual generation. The imagines of *Taeniorhynchus* (*Mansonia*) *richiardii*, Fic., are found singly in the woods near deep water in old stream beds and the larvae hibernate at the bottom of such water. *Aëdes cinereus*, Meig., *Ochlerotatus* (*Culicada*) *nemorosus*, Meig., *O.* (*C.*) *nigrinus*, Eckst., *O.* (*C.*) *diversus*, Theo., *O. geniculatus*, Oliv. (*C. lateralis*, Meig.), *O.* (*C.*) *ornatus*, Meig., *O.* (*C.*) *dorsalis*, Meig., *O.* (*C.*) *vexans*, Meig., and *Culex cantans*, Meig., all occur near Strassburg and hibernate in the egg-stage.

These observations prove the inadequacy of the present-day method of winter measures against mosquitos, which only aim at destroying the adult females.

Eckstein (F.). **Witterung und Stechmückenplage.** [Weather and Mosquitos.]—*Zeitschr. angewandte Entom., Berlin,* vi, no. 1, 1919, pp. 93–105, 1 fig., 1 chart.

A number of observations, made at Strassburg in the spring of 1918, are recorded regarding the influence of weather on the increase of mosquitos.

*Culex pipiens* depends on climate in the sense that an early spring and a warm, dry summer are particularly favourable to its increase. Furthermore its oviposition appears to depend somewhat on the occurrence of thunder-showers, for egg-rafts are very abundant afterwards. It is calculated that where conditions allow of 5 generations the descendants of one female may amount to 3,200,000 in a year. If unfavourable weather reduces the generations to 4, the total will fall to 160,000, while it may rise to 64,000,000 if 6 generations occur. As *Anopheles maculipennis* also hibernates in the adult stage its appearance is likewise dependent on the beginning of the warm weather. Its development however only permits of 2–3 annual generations. The hibernating larva of *A. bifurcatus* scarcely increases in size during the winter, and growth in spring depends on the temperature of the water, which is obviously related to weather conditions. *Ochlerotatus* (*Culicada*) *vexans, O.* (*C.*) *nigrinus* and *Aëdes cinereus* oviposit at the edges of temporary pools and the eggs only hatch when wetted in spring by a rise of the water-level due to local rain or to a rise of the subsoil water; in winter, wetting the eggs does not usually cause them to hatch. The eggs laid by the resulting imagines equally require to be wetted, and this explains why these species are rare in short, dry summers. In spring the Rhine is swollen by the snow melting in the Alps and a rise of about 6 ft. will flood many areas near Strassburg and produce swarms of mosquitos. *Culicada cantans* and *O.* (*C.*) *nemorosus* hibernate in the egg-stage and have only one generation in the summer. The eggs are deposited in the second half of summer. *O.* (*Culicada*) *ornatus* breeds in water in hollow trees. The eggs of each generation are laid above the edges of the water and heavy rains are required to raise the level of such collections of water and cause them to hatch. Development is greatly accelerated by a rise in temperature, requiring 36 days at 48° F. (9° C.) and only 10 days at 75° F. (24° C.). Hot, dry weather alternating with heavy rains therefore provides the optimum conditions for a large increase of *O. ornatus.* The chart accompanying this paper gives the above information in graphic form.

Glaser (F.). **Die Schnakenbekämpfung nach den neueren Erfahrungen.** [Anti-Mosquito Work on Modern Lines.]—*Vereinigung zur Bekämpfung der Schnakenplage, Mannheim,* 4 page leaflet dated December 1919.

The recent researches prosecuted by Bresslau, Eckstein and the author have supplied the necessary basis for anti-mosquito work in Germany, where hitherto the methods employed were chiefly suited to

*Culex pipiens.* It now has been proved that of the 20 German species, some 5 only hibernate as adults in cellars, sheds, etc. The majority pass the winter in the egg-stage, the eggs having been laid singly in dry situations during the warm weather. Some species, especially those that occur in vast swarms, may travel as far as 9 miles from their breeding-places. To decide whether operations are likely to be (*a*) successful, (*b*) successful but costly, or (*c*) hopeless, it is necessary first of all to determine the species concerned and to examine the localities.

The Anophelines are found wherever stagnant or slow-flowing water containing vegetation occurs and they have been observed at altitudes above 3,300 feet. They do not travel more than about one to two thousand yards, so that a number of communities are not required to co-operate in combating them. Anti-larval work is difficult on account of the large water-surfaces involved, but the adults of *Anopheles maculipennis* may be destroyed indoors by spraying with a suitable insecticide.

*Culex pipiens* may be described as a domestic mosquito and is the species most readily combated. In winter the hibernating females may be sprayed, first during the period November-December and then again in January-February. Summer treatment consists in oiling the breeding-places.

The AËDINAE cannot be combated in winter. Large communities may attempt the costly eradication of their breeding-places; if the latter are in forests, oiling may be resorted to, but in other situations the cost will be very high.

RICHARDSON (C. H.). **The Response of the House-fly to Certain Foods and their Fermentation Products.**—*Rept. Dept. Entom. 1916, New Jersey Agric. Expt. Sta., New Brunswick, N.J.*, 1917, pp. 511–519. [Received 2nd December 1919.]

The information contained in this paper has been noticed elsewhere [*R.A.E.*, B, v, 72].

PETERSON (A.). **House-fly Investigations.**—*Rept. Dept. Entom. 1917, New Jersey Agric. Expt. Sta., New Brunswick, N.J.*, 1918, pp. 479–484. [Received 2nd December 1919.]

A practical demonstration of well-known remedial measures against flies was held in 1917 at Beach Haven, New Jersey, where the conditions for fly control in the town are almost ideal, so that little remained to be done beyond eliminating the breeding-places in stables, etc. On 25th June all stalls in stables and other breeding-places were treated with borax (crystals). The floor-boards of stalls and other parts of the barn were examined every two weeks during the summer and only once did any stable require more than two treatments in order to prevent breeding. Manure was treated in various ways. Some was removed from stables daily and spread out on gardens or waste ground, where it dried rapidly and showed no evidence of fly-breeding. From another stable the manure was removed twice a week and placed on the marshes where the tides constantly soaked it with salt water. Another stable possessed a large cement pit and into this the manure was thrown and covered with water. This method was very satisfactory until the pit was filled and the manure exposed above the top and sides. Each day, where the borax treatment was given, 2½ gallons of water containing 1¼ oz. of borax was sprinkled on the daily output of manure from one horse. If in a very wet condition, the manure should be dried somewhat before treatment. Hellebore was tried as a substitute, but is far more expensive than borax. Manure treated with borax should not injure plants if not more than 15 tons are used to the acre.

Fly traps and poisoned baits were the means of capturing a number of flies, including *Stomoxys calcitrans* (75 per cent.), *Musca domestica, Calliphora erythrocephala, Lucilia sericata, Phormia regina, Fannia canicularis* and other species. The effect of poison of varying strength on flies is discussed ; 1 oz. to ⅛ oz. of sodium arsenite in a gallon of solution was found sufficiently toxic, but greater strengths killed a larger percentage in a shorter time.

HEADLEE (T. J.). **Report of the Mosquito Work for 1916.**—*Rept. Dept. Entom. 1916, New Jersey Agric. Expt. Sta., New Brunswick, N. J.*, 1917, pp. 521–557, 8 figs. [Received 2nd December 1919.]

Particulars are given of the drainage operations executed in the various counties. The mosquitos observed during the year included *Ochlerotatus* (*Aëdes*) *cantator, O.* (*A.*) *sollicitans* and *O.* (*A.*) *sylvestris* and *Culex pipiens*.

Many substances have been tested as larvicides and details are given of the results obtained ; these included metal salts, drugs and more or less pure organic chemicals. While a number of compounds destroy mosquito larvae, none was found to remain effective for more than a limited period after the application was made.

HEADLEE (T. J.). **Report on Mosquito Work.**—*Rept. Dept. Entom. 1917, New Jersey Agric. Expt. Sta., New Brunswick, N.J.*, 1918, pp. 485–520, 4 figs. [Received 2nd December 1919.]

The work accomplished in salt-marsh drainage by all agencies up to 1916–1917 and the effect of this work on the prevalence of the salt-marsh mosquitos are illustrated by a map. By the beginning of 1917, 95,000 acres of salt-marsh had been rendered reasonably free from mosquito breeding-places, and no brood of any importance had appeared during 1916 from that area. The various measures undertaken in certain localities during the year are described. The species occurring were the same as reported in the previous year [see preceding paper].

BRUNETTI (E.). **Diptera of the Simla District.**—*Records Indian Museum, Calcutta*, xiii, part 2, May 1917, pp. 59–101, 4 figs. [Received 3rd December 1919.]

Among the Diptera included in this extensive list collected in various localities at the base of the Himalayas and near Simla are the following blood-sucking species :—Simuliids, *Simulium indicum*, Becker. *S. senile*, Brun., *S. aureohirtum*, Brun. ; Chironomids, *Ceratopogon* (sub-gen. *Prohelia*) *decipiens*, Kieff., and *Culicoides montivagus*, Kieff. ; Culicids, *Anopheles plumbeus*, Hal. (*barianensis*, James & List.), *A. turkhudi*, List., *A. simlensis*, James & List., *Culex mimeticus*, Noé ; Tabanids, *Tabanus orientis*, Wlk., *T. excelsus*, Ric., *Therioplectes subcallosus*, Ric., *T. hirtus*, Wlk. ; Muscids, *Stomoxys calcitrans*, L., *Bdellolarynx sanguinolentus*, Aust., *Haematobia sanguisugens*, Aust., and *Stygeromyia maculosa*, Aust.

PRASHAD (B.). **The Description and Life-history of a New Species of *Anopheles* that breeds in Holes in Trees.**—*Records Indian Museum, Calcutta*, xv, no. 3, August 1918, pp. 123–127, 1 plate. [Received 3rd December 1919.]

*Anopheles annandalei*, sp. n., is described from a single male bred from larvae collected from a tree-hole at an altitude of about 5,000 feet in the Darjeeling district, Eastern Himalayas, in October 1917. The tree was in dense jungle close to a water supply which was brownish in colour and contained dead leaves and some Culicine larvae. The only other Indian Anophelines that have been described as breeding in tree-holes are *A. plumbeus*, Hal., and *A. culiciformis*, Cogil.

DE CASTRO (R.) **La Erradicación de las Garrapatas.** [Tick Eradication.]—*Estacion Expt. Agrón., Santiago de las Vegas, Cuba*, Circ. 57, 1919, 31 pp., 12 figs. [Received 3rd December 1919.]

The eradication of the tick, *Boophilus* (*Margaropus*) *annulatus*, the transmitter of bovine piroplasmosis, is of vital importance to the cattle industry of Cuba. The most that is done in this respect in the usual Cuban cattle-breeding establishments is to dip badly-infested animals in a solution of spirits or alcohol and sabadilla, or to use some other treatment, without any attempt to guard against re-infestation. The life-history and habits of the tick are described. There are two methods of eradication, which are most successful when applied simultaneously. These include the regular dipping of cattle in an insecticide solution in one of the well-known types of dipping tanks such as are used in North America and described and illustrated in this paper, or hand treatment with a spray pump apparatus. A favourite spray in Cuba consists of 1 lb. sabadilla to 1 gal. alcohol or spirits ; formulae are also given for arsenical dipping solutions.

Simultaneously with this treatment is the elimination of ticks from the pasture-grounds, which is frequently done by burning the pasture in the dry season. This is only possible when the pasture is low-growing and there is not much vegetation ; in Guinea and Paraná many ticks escape the action of the fire, protected by the moisture in the earth and by the chaff that is always lying about the pasture-grounds. The most efficacious and ultimately the cheapest method is considered to be rotation of grazing on the pasture-lands, the cattle being pastured successively on tick-free sections of the area. A belt of land about two yards wide should be ploughed all round the tick-free sections to avoid infestation from animals stretching over and dropping ticks on to the neighbouring section. The method of dividing the area into sections and the times of movements of cattle from one to another is explained.

ZETEK (J.). **Como evitar la Cria de Larvas de Mosquitos en "Canjilones," Floreros, etc.** [A Method of preventing Mosquito Breeding in "Canjilones," Flower-stands, etc.]—*Revista La Salle, Panamá,* November 1919, pp. 45–47.

In all the gardens of Panama, narrow channels filled with water are dug around flower-beds, etc., to protect plants against ants; these have the draw-back of providing breeding-places for mosquitos, among which is found the transmitter of yellow fever, *Stegomyia fasciata.* Oily larvicides have been tried, but heavy rains scatter the oil, which is absorbed by the soil and injures the plants. Householders are also frequently fined for the presence of mosquito larvae in the water-traps for ants placed around flower-pots, etc., and the larvae are also found in the bowls of holy water in churches. Experiments have demonstrated that a small quantity of camphor or of para-dichlorobenzene ($C_6H_4Cl_2$) prevents mosquito-breeding; in the channels around flower-beds it should be used in powder form, 1 or 2 grams being sufficient for each, and proves less expensive than camphor. In winter this treatment should be carried out once a week, and in summer every 10 days. For flower-stands, etc., the same quantity of the powder, or of either powdered or solid camphor should be applied every 15 days or as often as the water-traps are renewed. For use in churches, a little solid camphor is preferable.

BONNE-WEPSTER (J.) & BONNE (C.). **Four New South American Mosquitoes (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, vii, no. 7–9, July-September 1919, pp. 105–113.

The new species from Surinam here described are: *Wyeomyia occulta,* of which the larvae were found in a jelly-like mass at the base of leaves of *Heliconia*; *W. albosquamata,* larvae of which were found in Bromeliaceae; *W. fallax* and *W. splendida* found in similar plants.

BONNE-WEPSTER (J.) & BONNE (C.). **Description of the Larvae of** *Wyeomyia aphobema,* **Dyar (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, vii, no. 7–9, July-September 1919, p. 114.

The larvae described were found in Bromeliaceae near Paramaribo, Surinam.

DYAR (H. G.). **A Revision of the American Sabethini of the** *Sabethes* **Group by the Male Genitalia (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, vii, no. 7–9, July-September 1919, pp. 114–142, 1 plate.

The species dealt with include: *Dinomyia proviolans,* gen. et sp. n., from Panama; *Wyeomyia melanopus,* sp. n., and *W. roloncetta,* sp. n. from Panama, bred from a *Bromelia* growing on a tree.

A key to the genera is given and also to the species of *Miamyia,* gen. n., *Sabethinus,* Lutz, *Sabethes,* R-D., *Sabethoides,* Theo., *Triamyia,* gen. n., *Phomyia,* Theo., *Heliconiamyia,* gen. n., *Dendromyia,* Theo., *Wyeomyia,* Theo., *Decamyia,* gen. n., *Menolepis,* Lutz, *Dodecamyia,* gen. n., and *Hystatomyia,* gen. n.

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Dyar (H. G.). **A new Subgenus of *Culex*, Linn. (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, vii, no. 7–9, July-September 1919, p. 150.

*Culex* (*Eubonnea*, subg. n.) *tapena*, sp. n., is described from Paramaribo, Surinam, where it was captured about 7 p.m. indoors. It was also bred from a pupa found in a permanent pool with much vegetation.

Roubaud (E.). **Antagonisme du Bétail et de l'Homme dans la Nutrition sanguine de l'*Anopheles maculipennis*. Le Rôle antipaludique du Bétail domestique.**—*Bull. Agric. Algér.-Tun.-Maroc, Algiers*, Ser. 2, xxv, no. 11, November 1919, pp. 272–273.

Observations made in France in the districts of the lower Loire and the marshes of the Vendée show that man is greatly protected from malaria by the presence of other animals, especially domestic animals. Man is only attacked by *Anopheles maculipennis* in the absence of other available food in the form of mammalian blood, for which distinct preference is shown in the following order: pigs, cattle, horses, goats and sheep, rabbits and dogs.

de Meza (J.). **The Common Ticks of Nyasaland with some special Notes on the Anatomy and Biology of Ticks in General.**—*Nyasaland Prot. Dept. Agric., Zomba*, Bull. 1, 1918, 32 pp., 13 figs. [Received 10th December 1919.]

The general biology, anatomy and classification of ticks are discussed· A list of the species occurring in Nyasaland together with their respective life-histories and the usual remedial measures are given. This list of 14 species includes the following known disease carriers: *Argas persicus*, *Ornithodorus moubata*, *Boophilus decoloratus*, *Haemaphysalis leachi*, *Rhipicephalus appendiculatus*, *R. evertsi*, *R. simus*, *R. capensis*, *Amblyomma hebraeum* and *Hyalomma aegyptium*.

Bacot (A.) & Talbot (G.). **The Survival Period of Lice and Nits (*Pediculus humanus*) when submerged in Tap Water and Water containing 1 per cent. of Salt at various Temperatures.**—*Brit. Med. Jl., London*, no. 3074, 29th November 1919, p. 703.

These experiments show that although active lice are killed by immersion in salt water, this method cannot be relied upon for the cleansing of verminous textiles, even when they are allowed to soak for 24 hours, unless the temperature of the water is above 90° F. The eggs apparently fail to hatch owing to the want of continued heat necessary for their incubation. Under these conditions, plain tap water has proved as effective as that containing salt.

Bacot (A.) & Lloyd (L.). **Experiments concerning the Destruction of Active Lice (*Pediculus humanus*) by Solutions of Cresol Soap Emulsion and Lysol, and of Lice and Nits with Kerosene, with a View to the Use of these Remedies for the Treatment of Verminous Heads.**—*Brit. Med. Jl., London*, no. 3074, 29th November 1919, pp. 704–705.

As shown in the previous paper the temperature of the solution used for the destruction of lice and their eggs is the most important factor. Clothes are rendered safe by immersion in a 2 per cent. solution of lysol for 30 minutes at a temperature of from 100° to 104° F., whatever the subsequent treatment may be. Cold solutions were effective when used at a minimum strength of 1½ per cent. with an immersion period of 1 hour, provided that the solution remaining on the fabric after dipping was allowed to dry in. Sponging infested hair with a 2 per cent. solution of lysol warm or cold is useless if this is followed immediately by rinsing. This is thought to be due to a reflex action in the louse by which it closes the spiracles for a short period, thus preventing penetration of the noxious fluid. Experiments were also made by placing lice and eggs on flannel which was subsequently immersed for 5 minutes in kerosene at a temperature of 68° F., with the result that all active lice died within 48 hours regardless of subsequent treatment. The death of active lice following immersion in kerosene appears to be due rather to the oil on the surface of the insect or the object to which it clings obtaining entrance to its body after removal from the fluid than during the short period of immersion. As regards the eggs, penetration by kerosene is too slow for its entrance to occur within the time of immersion, but subsequent to their removal the fluid or its vapour inhibits development. In experiments where the eggs immersed in kerosene hatched the young lice died in the process of emergence from the egg.

**Cattle-Tick Regulations.**—*N. Z. Jl. Agric., Wellington,* xix, no. 4, 20th October 1919, p. 263.

The laws that came into force on 2nd October 1919 concerning quarantine, notification and treatment by dipping or some other effective method of dealing with tick-infested cattle, are reviewed. For the purpose of these regulations cattle-tick means any parasite of the family IXODIDAE and does not include the Hippoboscid fly, *Melophagus ovinus.* All stock intended for removal must be treated as authorised by the inspector, forty-eight hours previously.

RICH (S. G.). **Are the Odonata of Economic Value ?**—*S. African Jl. Sci., Cape Town,* xv, no. 8, July 1919, pp. 611–612.

In Africa adult dragonflies are apparently not of much economic importance, but in the nymphal stage they are probably both beneficial and harmful. In several rivers and pools examined where dragonfly nymphs were abundant very few mosquito larvae were found, although conditions seemed ideal for them. In districts where mosquitos were abundant there were very few dragon-flies to be seen. With one exception all waters containing nymphs of Odonata were sparsely inhabited by fish.

STOREY (G.). **Keys for the Determination of Egyptian Mosquitos and their Larvae.**—*Bull. Soc. Entom. Egypte, Cairo,* 1918, no. 4, September-December 1918, 1919, pp. 84–106, 2 plates. [Received 29th December 1919].

Keys are given for the determination of adult mosquitos of Egypt from easily visible external characters; for the determination of the various species of the genus *Culex* by means of the male genitalia and for the determination of the larvae by easily visible characters.

The species dealt with in these keys are the following :—*Anopheles bifurcatus,* L., which is apparently one of the very worst malaria carriers ; *A. turkhudi,* List., which is the commonest malaria carrier, being particularly abundant in oases and in drains with salty water ; *A. palestinensis,* Theo., which may perhaps be found to be identical with *A. sergenti* ; *A. mauritianus,* Grp., which is not regarded as a malaria carrier ; *A. pharoensis,* Theo., which is probably the most widely-distributed Anopheline in Egypt, but a doubtful malaria carrier, and is frequently found accompanying *Culex invidiosus* and *C. decens* ; *Stegomyia fasciata,* F. (yellow fever mosquito), which is not very abundant in Egypt, but quickly appears in vessels of water left standing in houses ; *Ochlerotatus caspius,* Pall. (*dorsalis,* auctt.), which occurs in salty swamps and stagnant pools and is one of the commonest mosquitos of Egypt ; *O. longisquamosus,* Theo., which greatly resembles *O. caspius* and may be only a local variety of it ; *O. nemorosus,* Meig., which is recorded from two localities only; *Theobaldia longiareolata,* Macq., chiefly found in the winter in the adult form, the larvae usually occurring in stagnant puddles ; this species rarely bites human beings ; *Culex quasigelidus,* Theo., which is widely distributed, but not numerous ; *C. tipuliformis,* Theo. (*theileri,* Theo.), common about oases ; *C. pusillus,* Macq. ; *C. pipiens,* L., which constitutes the great majority of mosquitos taken in Egyptian houses, and is very common in cesspools and also in comparatively pure water ; *C. invidiosus,* Theo., which is the commonest mosquito in infiltration water, stagnant canals and drains, etc. ; *C. decens,* Theo., which may be only a variety of *C. invidiosus,* and may also be synonymous with *C. pallidocephalus,* Theo. ; an unidentified species of *Culex* which is new to Africa and probably new to science ; *Uranotaenia unguiculata,* Edw., which has not previously been recorded from Egypt, but is widely distributed and often abundant, especially in permanent pools and in infiltration water.

Other species recorded from Egypt by other writers, but considered as of doubtful identity by the author of the present paper, include *Anopheles maculipennis,* Meig., *A. squamosus,* Theo., *Stegomyia sugens,* Wied., and *Culex fatigans,* Wied.

EWING (H. E.). **Stable-flies and Chiggers.**—*Jl. Econ. Entom., Concord, N. H.,* xii, no. 6, December 1919, p. 466.

*Trombidium striaticeps,* Oud., which is one of the three mites in Europe that attack man and domesticated animals, is reported from Washington, D. C., as infesting *Stomoxys calcitrans.*

BARBER (G. W.). **A Note on Migration of Larvae of the House Fly.**—*Jl. Econ. Entom., Concord, N. H.,* xii, no. 6, December 1919, p. 466.

Attention is drawn to the migration of a number of larvae of *Musca domestica,* which were observed to travel a distance of from 1 to 150 feet rather than pupate in the earth under the manure in which they were breeding.

HALL (M. C.) & AVERY (L.). **The use of Carbon Bisulphid in Infestations with Bots, *Gastrophilus* spp.**—*Jl. Amer. Vet. Med. Assoc, Baton Rouge, La.*, lvi, no. 3, December 1919, pp. 265–270.

Experiments made to ascertain the minimum effective dose of carbon bisulphide for the removal of bots in horses show that single doses of 6 drachms or 2 doses of 4 drachms each given at an interval of two hours will remove all species of *Gastrophilus* from the stomach and duodenum; three doses of 3 drachms each at intervals of 1 hour are equally effective. Smaller doses will remove *G. intestinalis* from the cardiac stomach, but are not effective against *G. nasalis* owing to the location of the larvae of this species, as apparently by the time the drug reaches the pylorus, it has been partly absorbed and diluted with the fatty contents of the stomach, its lethal action being thus reduced. If purgatives are given they should be administered several hours, at least, before or after the drug. The use of linseed oil diminishes the efficacy of carbon bisulphide against *Gastrophilus*. The work of previous authors on this subject is reviewed.

WOLLMAN (E.). **Larves de Mouche (*Calliphora vomitoria*) et Vitamines.**—*C. R. Soc. Biol., Paris*, lxxxii, no. 29, 22nd November 1919, pp. 1208–1210.

Further investigations have been made concerning the hypotheses suggested in a previous paper [*R.A.E.*, B., vii, 140]. Larvae of *Calliphora vomitoria* thrived well even when fed on brains that had been sterilised at a heat of 134° to 135° C. [273°–275° F.] for 1½ hours. The larvae treated in this manner were noticed to develop rather more slowly than usual during the first 2 days, but by the 6th or 7th day they had reached their normal size and pupated as usual from the 8th to 10th day.

Sterilisation even at a temperature of 134° C. does not appear therefore to destroy the vitamines of certain foodstuffs. It is not thought probable that the larvae themselves create vitamines, but rather that they accumulate and concentrate those present in their diet.

SCOTT (H. H.). **Coincident Malaria and Enteric Fever.**—*Ann. Trop. Med. Parasit., Liverpool*, xiii, no. 3, 10th December 1919, pp. 195–214, 13 charts.

The author gives the following summary of this paper:—Anti-typhoid inoculation has been reported to reduce susceptibility to malaria. Enteric fever in Jamaica is a severe affection with comparatively high mortality. Malarial infection in Jamaica is also a severe condition; in a large majority of cases it is of the subtertian variety. Quinine does not have any marked effect on uncomplicated cases of enteric fever. The serum of patients suffering from uncomplicated malarial fever will not give a positive reaction to Widal's agglutination test. Coincident enteric fever and malaria (that is, when a patient is seen early in the attack of enteric fever and examination of the blood reveals the presence of malarial parasites at this early stage) in many instances at least is remarkably mild in type and in course, and recovery is usually rapid and complete, more so than in the case of either affection separately.

Hatori (J.). **On the Endemic Tsutsugamushi Disease of Formosa.**—*Ann. Trop. Med. Parasit., Liverpool,* xiii, no. 3, 10th December 1919, pp. 233–258, 2 plates.

The endemic exanthematous fever in the Karenko District of Eastern Formosa has been proved to be related to the tsutsugamushi or kedani disease of Northern Japan.

The transmitter of the virus is a mite, apparently identical with the Japanese species, *Trombidium* (*Trombicula*) *akamushi*, Brumpt. The natural hosts of this parasite include *Mus rattus rufescens* (common house rat of the island), *M. decumanus*, *M. musculus*, *M. agrarius*, etc., and such insectivores as *Crocidura muschata.* Pheasants, chickens and even dogs and cats may be infested by the mite. Human beings are attacked when passing through infested fields or forests. The mite-infested localities are limited to the valleys, uncultivated land covered with tall grass and flat or sloping ground covered with thick forest. Mites from the ear of an infested rat were noticed to leave the host when fully fed and enter the soil, where they moult and transform to nymphs. An attempt to develop these nymphs on vegetable matter was unsuccessful. The mites probably acquire the virus in the adult stage and transfer it to their offspring. The spread of the mites is chiefly due to the migration of their hosts, such as rodents, etc.

Larvae of another species were found in certain fields living freely on grasses. This species has been provisionally named *Trombicula pseudoakamushi* (non Tanaka) by the author, as he considers it a new species, although Prof. Miyajima believes the larva to be identical with the European *Leptus autumnalis* and the adult with *Trombicula mediocris,* Berl., of Java. It apparently does not infest man.

The causative virus of the disease is probably of ultra-microscopic nature, as no organism has been isolated. The fever usually appears in April and persists till July, after which it declines, rising again in October and subsiding in November. Immigrants are apparently more susceptible to the virus than the natives. Experiments with animals show that some species of indigenous monkeys are definitely susceptible to the virus either through inoculation of a patient's blood or through bites of the mites in an infected field, whereas others seem resistant; this is probably due to an immunity arising from attack in their previous habitat.

Comparisons are made between the Japanese and Formosan tsutsugamushi disease and allied endemic glandular fevers. The clinical aspect and treatment of the disease is discussed. Preventive measures include complete protection of the body when traversing mite-infested areas and thorough disinfection of all clothes prior to entering dwelling houses. Cleanliness is essential, and the body should be well examined after field work for red spots, which must either be excised or the mite removed from the centre with a needle.

The infested areas should be cleared by burning, and brought under cultivation. All inhabitants of infested territory should be educated as to the nature of the disease and its transmitter.

FIELDING (J. W.). **Notes on the Bionomics of *Stegomyia fasciata*, Fabr. (Part I).**—*Ann. Trop. Med. Parasit., Liverpool,* xiii, no. 3, 10th December 1919, pp. 259–296.

In the course of breeding large numbers of *Stegomyia fasciata* for the requirements of the Australian Institute of Tropical Medicine observations were made on various points that required elucidation. A chart is given showing the temperature and humidity readings in the grounds during the period occupied by these experiments. The method of keeping and feeding the adult mosquitos is discussed. An exclusive diet of blood for the females and of bananas for the males proved most satisfactory. The egg-laying period of a fertilised captive female is from 40 to 72 days with an average of about 750 eggs. Apparently no preference is shown for any place for the purpose of oviposition, the eggs being deposited in almost any receptacle containing water. In experiments to ascertain if ovipositing females prefer contaminated water it was noticed that sugar and water appeared to be the most attractive bait, although this gave unfavourable results as food for the larvae; no eggs were laid in water containing more than 70 per cent. of sea-water. During the summer the eggs hatched on the second or third day, and during the winter on the third or fourth day. Experiments with regard to the influence of drying on the hatching of eggs, cooling of resistant eggs, submergence in small and large quantities of water, and retention of eggs by gravid females, show results similar to those of previous authors [*R.A.E.*, B, iv, 161]. When eggs were dried over calcium chloride, after 7 days treatment 80 to 90 per cent. hatched, after 19 days, 8 to 15 per cent. and after 26 no eggs hatched. Of resistant eggs immersed for 30 seconds in lysol and then re-immersed in water 87·9 per cent. hatched in about 24 hours. Soap solutions produced similar results to petroleum soft-soap emulsion and 69·2 per cent. of the resistant eggs hatched in 24 hours. The position of the eggs, whether floating or submerged, has little influence upon the hatching. From 150 dried eggs immersed in sea-water 77·3 per cent. hatched, whilst from an equal number placed in tap water 83·3 per cent. hatched. No adults were reared from freshly laid eggs placed in tap water containing more than 40 per cent. of sea-water.

The development of larvae under artificial conditions at room temperature is apparently not influenced by the presence or absence of light, but excessive heat increases the mortality. The approximate maximum temperature that the larvae and pupae are capable of withstanding without great mortality is about 105° F. Experiments have been made with various foods, including polished rice, mango leaf, fowl faeces, broth and fly maggots, etc., added in varying quantities to the water containing larvae; the results are shown in tables.

The length of life of adults varies greatly with the diet, 7 days being the maximum for unfed individuals, and 93 days was the longest period when a suitable diet such as blood and bananas was provided. No oviposition occurred with females fed on food other than blood, with the exception of the cases in which peptone and sugar was substituted, when 60 per cent. of the eggs laid proved fertile. Fertilisation of the female greatly increases the production of eggs.

Péju (G.). **Culicides dans les Ardennes (avec Présentation d'une Carte des Foyers d'Anophèles).**—*C. R. Soc. Biol., Paris,* lxxxii, no. 31, 6th December 1919, pp. 1267–1269.

In spite of the latitude and cold climate of the Ardennes various Anopheline centres have been located which are responsible for the locally acquired malaria among the troops occupying the trenches in this region during the war.

The numerous clear rivers of the south of this district and the stagnant waters with impermeable subsoil of crystalline rock in the north offer ample conditions favourable to the breeding and development of Anophelines.

Of the mosquitos in the district the Anophelines, represented by *A. maculipennis* and *A. bifurcatus,* form about 8 to 9 per cent. The majority are found in the vicinity of stables, cowsheds and inhabited localities. From the middle of October they begin to disappear out of doors and by November only a few stragglers are found in dwellings, whereas in stables and cowsheds about 20 per cent. of those present during the summer may still be found. This fact seems to indicate the desirability of directing prophylactic measures against the adults in preference to the larvae, especially of *A. maculipennis.*

Sergent (Et.). **Le *Plasmodium relictum,* Agent pathogène du Paludisme des Oiseaux, ne donne pas une Maladie mortelle au Moustique transmetteur.**—*Bull. Soc. Path. Exot., Paris,* xii, no. 9, 12th November 1919, pp. 601–603.

It has always been considered that malarial plasmodia are highly pathogenic to the insect vector, but if this were so it would be logical to suppose that after a severe epidemic of malaria the number of infected mosquitos would be greatly diminished, and this has not been observed. It is true that Anophelines are generally less abundant in autumn, but this is largely explained by meteorological conditions; moreover, they are generally more highly infective at this period than in the summer. Many cases of malaria, although contracted in the summer, do not become highly virulent until the autumn. Observations in the laboratory confirm the hypothesis suggested by these reflexions, namely that the plasmodia are not very pathogenic to the insect transmitter of the virus. Among some hundreds of cases of infestation of *Culex* spp. by *Plasmodium relictum,* each of which carried at least 100 zygotes at their maximum development, no higher rate of mortality was observed than among slightly infected or entirely uninfected individuals.

Sergent (Et.). **Dans le Paludisme des Oiseaux (dû au *Proteosoma*) il n'y a pas de Parallélisme entre l'Infection sanguine de l'Oiseau et l'Infection consécutive du Moustique contaminé par l'Oiseau.**—*Bull. Soc. Path. Exot., Paris,* xii, no. 9, 12th November 1919, pp. 603–605.

For about a week malarial fever in birds is very acute, and during this time blood parasites are found in all stages, gametes being numerous. *Culex* spp. allowed to feed upon them at this time showed an average of 36 zygotes each. When fed upon the blood of a bird several days after the acute period of the fever when gametes are rare, the *Culex* showed an average of 14 zygotes each, which is a surprising number in view of the scarcity of gametes in the host; while about a month after the acute period, when the blood parasites are extremely scarce or non-existent in the host, newly-fed Culicines showed an average of 0·43 zygotes each. A graph illustrates the intensity of infection in the bird and simultaneously the intensity of gastric infection in the insect, and it is obvious that these do not follow the same curve. It is evident that in malaria of birds the blood of the vertebrate remains highly infective to the insect for a fortnight after the acute stage of the fever is passed, in spite of the scarcity of parasites in the blood.

Roblin (—). **Foyer de Paludisme autochtone en Seine-et-Marne.**—*Bull. Soc. Path. Exot., Paris*, xii, no. 9, 12th November 1919, pp. 605–607.

Cases of malaria contracted in France in a malaria-free region are described, following upon the return to the locality of a soldier from the Near East who had suffered from the disease and had two relapses after his return. In all cases the organism concerned was *Plasmodium vivax*, and the tributary of the Seine that runs through the district in question was found to harbour *Anopheles maculipennis*. These observations show that too much importance cannot be attached to the return to civil life of individuals infected with malaria, in view of the danger of propagation of the disease in Anopheline districts.

M. Brumpt, in a note appended to this paper, records the fact that together with the author, he has studied 20 cases of locally acquired malaria, all caused by *P. vivax* and traceable to infection from the French front. These observations will be published later, together with records of 25 cases of relapses occurring in France as long as 450, 538, 702 and 771 days after infection with *P. vivax*.

Parrot (L.). **Trois Observations de Bouton d'Orient avec des Réflexions sur les Circonstances de la Contamination.**—*Bull. Soc. Path. Exot., Paris*, xii, no. 9, 12th November 1919, pp. 607–611.

Three cases of infection with Oriental sore are described on account of their apparent confirmation of the hypotheses formulated by MM. Sergent and others regarding the rôle played by the gecko and *Phlebotomus* in the origin of the disease. In July 1918, eight females of *Phlebotomus* sp. were captured in a locality on the Constantine table-lands where Oriental sore is unknown and were placed in a cage containing six geckos (*Tarentola mauritanica*) taken from a known centre of endemic leishmaniasis. Ten days later the *Phlebotomus* were found to have escaped from the cage and subsequently, before the end of November, the three persons forming the household in which the cage was kept all developed the disease, though only one of them might possibly have visited an endemic centre of Oriental sore throughout the period.

da Matta (A.). **Un nouveau Réduvide de l'Amazone,** ***Rhodnius brèthesi*****, sp. n.**—*Bull. Soc. Path. Exot., Paris*, xii, no. 9, 12th November 1919, pp. 611–612. 1 fig.

Among a number of blood-sucking Rhynchota sent from various localities on the Amazon are many individuals of *Rhodnius prolixus*, Stål, the vector of Chagas' disease. The examples of this genus found in mid-forest in the community of Barcelos, Rio Negro, differ from *R. prolixus, R. limosus, R. nasutus* and *R. pictipes*, in having a generally black appearance, and are therefore regarded as new and are described under the name, *R. brèthesi*.

Lignières (J.). **Contribution à l'Etude de l'Anaplasmose bovine.**—*Bull. Soc. Path. Exot., Paris*, xii, no. 9, 12th November 1919, pp. 641–651.

As a result of many experiments in the inoculation of *Anaplasma argentinum* into various animals, it has been shown that guinea-pigs, rabbits, pigs and horses are apparently not susceptible to this parasite. Sheep and goats are susceptible, the parasite remaining in their blood for years. The passage of the virus from sheep to sheep or from goat to goat is possible indefinitely. The inoculation of *A. argentinum* into sheep and goats does not produce the definite symptoms or lesions of anaplasmosis, nor are the typical parasites visible in the blood. They are however undoubtedly present, as can be proved by further inoculations; probably they are so small that they are difficult to recognise. The blood of sheep and goats inoculated with the parasite is active when injected into susceptible cattle. The possibility of attenuating the virus in sheep and using it as a vaccine against bovine anaplasmosis will be discussed in a future paper.

Brumpt (E.). **Transmission de la Piroplasmose canine française par le** ***Dermacentor reticulatus*****. Embolies parasitaires dans les Capillaires de l'Encéphale.**—*Bull. Soc. Path. Exot., Paris*, xii, no. 9, 12th November 1919, pp. 651–664. 4 figs.

The writings of various authors on the mode of transmission of canine piroplasmosis are briefly reviewed. The disease is transmitted by the adult stage of the tick, *Dermacentor reticulatus*. The infection is hereditary, the larvae and nymphs conserving the virus even when reared on immune animals such as the hedgehog or guinea-pig, but being unable to transmit the disease until they reach the adult stage. Larvae and nymphs fed upon virulent blood cannot transmit the disease in their later stages. It has not yet been possible to work out the percentage of female infective ticks of the second generation, but investigations are still being carried on. The parasites multiply chiefly in the capillaries of the brain and also, with less intensity, in the kidney and the bone marrow.

Laveran (A.) & Franchini (G.). **Sur les Flagellés parasites de quelques Insectes et sur les Infections qu'ils peuvent produire chez les Souris.**—*Bull. Soc. Path. Exot., Paris*, xii, no. 9, 12th November 1919, pp. 665–671, 2 figs.

Experiments are described in which white mice were inoculated with pure flagellate cultures from mouse and dog fleas, *Herpetomonas* *ctenopsyllae*, Laveran & Franchini, and *H. ctenocephali*, Fantham, with the flagellates of *Nepa cinerea*, *H. jaculum*, Léger, and with *Crithidia melophagi*, Flu, from the sheep Hippoboscid [*Melophagus ovinus*].

Of 16 mice inoculated with cultures of *H. ctenocephali* and *C. melophagi*, 9 died or were killed when in a dying condition. As the cultures were pure, there was no question of any bacterial infection associated with the flagellates The gravity of the disease was in direct proportion to the age of the mice, the youngest being the most severely affected. Examination showed an increase of volume in the liver and spleen, liver smears showing numerous parasites, apparently *Herpetomonas*. In the case of mice inoculated in the peritoneum with blood from the liver or spleen of a mouse inoculated by cultures, no increase of virulence in the parasite has been noticed.

Schwetz (J.). **La Maladie du Sommeil dans le Nord-Katanga (Congo Belge) en 1913–1918.**—*Bull. Soc. Path. Exot., Paris*, xii, no. 9, 12th November 1919, pp. 671–680, 1 map.

The country in the region of the Lomami River in which tsetse-fly conditions have been studied by the author is described, and an account is given of the preferred habitat and vegetation in which each species is found. The species include *Glossina morsitans*, *G. palpalis*, *G. pallidipes*, *G. brevipalpis* and *G. fusca*. A study of the relations between these flies and sleeping sickness has led the author to the conclusion that while *G. palpalis* seems undoubtedly to be the principal carrier, and while other species of *Glossina* may take some share in its transmission, neither *G. palpalis* alone nor yet the other species in conjunction can explain the incidence of the disease. The aetiology or at least the epidemiology of sleeping-sickness being so obscure, it is not astonishing that prophylaxis has given such poor results up to the present time, especially in view of the fact that it is almost impossible to carry out prophylactic measures amongst the natives.

Escomel (E.). **Le *Latrodectus mactans* ou "Lucacha" au Pérou. Etude clinique et expérimentale de l'Action du Venin.**—*Bull. Soc. Path. Exot., Paris*, xii, no. 9, 12th November 1919, pp. 702–720, 2 figs.

The poisonous spider, *Latrodectus mactans*, has existed in north and south Peru from very early times, though recent studies in Arequipa have drawn attention to it for the first time. It lives among stones and small plants, preferably on the boundary between cultivated and uncultivated regions, and sometimes enters maize and lucerne fields, constituting a danger to the harvesters or animals in them. In man and animals the poisonous bite produces more or less severe symptoms. A strong intraperitoneal injection of extracts of the eggs rapidly causes death. Repeated bites have produced a certain degree of immunity in laboratory animals. Fractional injections of the eggs have not in any case produced immunity, for, sooner or later, as soon as the toxic stage is reached or passed, the animal dies. The poison, the eggs in the cocoons, the eggs in the abdomen of females, and young spiders recently hatched, all produced venomous haemolytic extracts of decreasing strength in the order mentioned. The best treatment is permanganate of potash applied both externally and internally, and, if used promptly and correctly, this is a certain cure.

SCHWETZ (J.). **Recherches sur les Glossines.**—*Ecole Méd. Trop., Brussels,* 1919, 150 pp., 4 maps, 5 figs. [Received 30th December 1919.]

The majority of the papers incorporated into this volume have previously been noticed [*R.A.E.*, B, iv, 30, 31, 43 ; vi, 39, 144 ; vii, 80, 135]. Later observations are recorded on the habits of *Glossina brevipalpis, G. fusca, G. pallidipes, G. palpalis,* and *G. morsitans,* and a map shows the geographical distribution of these species in the north Katanga district of the Belgian Congo.

The habits of *G. fusca* vary considerably at different periods of the year. This species, in general with all other species of *Glossina,* diminishes in numbers in the dry season, especially during the bush fires. This decrease, being due to lack of shade and moisture, is less noticeable in dense vegetation near water, but in districts where no shade remains after the falling of the leaves the flies may disappear entirely, though temporarily.

Even under the most adverse conditions the flies succeed in escaping destruction, frequently by migration, or owing to the existence of sites favourable to the pupae.

The result of six years' work on the habits of tsetse-flies have been entirely negative from a practical medico-prophylactic standpoint. Any proposals for the destruction of adult flies seem futile in view of their seasonal migration ; a more promising possibility would be the discovery of an efficacious method of destroying the pupae. This, however, presents many difficulties, now that it is known that the pupae are not necessarily found in certain well-defined spots, but that they occur in the most varied locations and frequently far from their preferred habitat. Even *G. palpalis,* which breeds for preference beside water. will withdraw for 100 yards or more if the immediate vicinity of the water is not suitable for one reason or another. The subject, however, is not yet exhausted and calls for further research.

The discovery of *G. tabaniformis,* Westw., in the north of the province of Katanga is recorded.

FLETCHER (T. B.). & OTHERS. **Second Hundred Notes on Indian Insects.**—*Agric. Research Inst., Pusa,* Bull. 89, 1919, 102 pp., 58 figs. [Received 30th December 1919.]

The occurrence of the mosquitos, *Ochlerotatus oreophilus, Culex nilgiricus* and *C. mimeticus,* in India here recorded has been noticed elsewhere [*R.A.E.*, B. iv, 64], as has also the information given with regard to the life-history and habits of the eye fly, *Siphunculina* (*Siphonella*) *funicola,* De Meij. [*R.A.E.*, B., vi, 22].

ALESSANDRINI (G.). **I Pidocchi nella Profilassi del Tifo esantematico.** [Lice in Connection with the Prophylaxis of Exanthematous Typhus.]—*Ann. d'Igiene, Rome,* xxix, no. 9, 30th September 1919, pp. 557–598, 9 figs., 8 plates. [Received 30th December 1919.]

In the case of *Haematopinus suis* and in *Pediculus humanus* fed on pigs the author states that 80 per cent. of the larvae yield females. Assuming the number of eggs per female to be 70, the third-generation progeny of one pair of lice may number 44,689 males and 178,751 females. With regard to the resistance of lice to fasting, larvae that have not yet moulted cannot live more than 30 hours without food; after 10-12 hours they become inactive and though they may attempt to feed again after 20-25 hours they do not recover. Larvae that have moulted behave similarly if prevented from feeding immediately after moulting, but if allowed even one feed their resistance is increased; some remained alive for 3 days at 82° F. (28° C.) Besides this capacity for fasting and resisting unfavourable temperatures lice possess in their organs of touch, smell and sight important means of defence against such conditions. Tactile sensibility depends chiefly on a perception of varying degrees of heat. The author uses this fact when collecting lice. Infested rags and other materials are put in a glass funnel placed on a thermostat with its nozzle inside the chamber. The chamber is heated to the optimum temperature and the lice soon leave the rags and sliding down the nozzle fall into a dish below. The sense of smell plays the most important part in keeping lice from unsuitable situations. Agricultural labourers with habits of personal uncleanliness similar to those of beggars are stated to remain uninfested because, whereas the beggars have a "human" odour, the labourers dispense an earthy smell with an aroma of garlic and onion due to their diet. The influence of light is well known and also that exercised by colour. In view of the above facts it is clear that migrations of these parasites are mainly due to their own activity; passive carriage by other insects or wind may occur, but only exceptionally.

In a previous paper [*R.A.E.*, B, iv, 83] various remedial measures were discussed. Since then many new suggestions have been advanced, but it still remains true that very few methods are quite reliable and some of them have no practical value. Exposure to dry heat or to sulphurous anhydride appear to be the best measures hitherto discovered. The author's method of using sulphurous anhydride is as follows: The garments to be treated are placed in a wooden or earthen container in which a given quantity of a 4 per cent. solution of commercial sulphuric acid has been placed. When the clothes have been stirred about and well soaked, a 20 per cent. solution of sodium hyposulphite, double the quantity of the former solution, is added. The clothes are again thoroughly stirred and a very close-fitting or hermetically-sealed lid is put on. *Pediculus humanus* (*vestimenti*) and *Haematopinus suis* die after submersion for 10 minutes, even if the clothes are rinsed with plain water immediately afterwards. The eggs of these lice are killed at the same time. Even when protected by bags of material of varying thickness the lice and their eggs die in 10 minutes, or in 20 minutes if the material is the thick cloth used for uniforms by the Italian army. This treatment does not injure the material, except that in some cases rose or yellow colours may be subject to a slight uniform discoloration.

ADELMANN (E.). **Beitrag zur Kenntnis des Papataci-fiebers.** [Contribution to the Knowledge of Sandfly Fever.]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipzic,* xxiii, no. 5, March 1919, pp. 81–99, 7 charts.

During observations made during 1916–1917 with the German section in the Dardanelles, *Phlebotomus papatasii* was found to be the carrier of the disease. It chiefly occurs between mid-May and mid-October and the fever was prevalent during those months. *P. papatasii* appears to be most active at sunrise and during the hottest hours of the day. It is extremely sensitive to air currents and such disturbances as are caused by waving the hand are sufficient to affect it at a distance of about 5 feet.

NÖLLER (W.). **Beitrag zur Kenntnis des Schaftrypanosomas. Vorläufige Mitteilung.** [A Preliminary Note on the Sheep Trypanosome.]—*Arch. f. Schiffs- u. Tropen-Hyg., Leipzic,* xxiii, no. 5, March 1919, pp. 99–100.

The sheep trypanosome has hitherto been found by only two observers. Woodcock in 1910 saw a living trypanosome in sheep blood and Behn found it in 1911 and 1912 in thick cover glass preparations from some sheep in Thuringia. Cultivation from sheep blood has not yet been successful.

It is known that in Germany nearly all examples of the Hippoboscid fly, *Melophagus ovinus*, L., are infected with a trypaniform flagellate named *Crithidia melophagi* by Flu in 1908. These flagellates are so remarkably like the developmental stages of the trypanosomes from *Glossina* that some observers held them to be only developmental forms of the sheep trypanosome, which latter may be as rare in the blood of sheep as *Trypanosoma theileri* in that of cattle.

Experiments made by the author show that the sheep trypanosome is a distinct species, transmitted by *M. ovinus*, that must be called *Trypanosoma melophagi*, *Crithidia melophagi* being a developmental form of it. Further experiments are being made with a view to confirming the above result and to elucidate the entire developmental cycle.

DU TOIT (P. J.). **Experimentelle Studien über die Pferdepiroplasmose. I. Mitteilung. Kreuzimpfungs-versuche mit** ***Nuttallia equi*** **(Laveran, 1901) und** ***Piroplasma caballi*****, Nuttall, 1910.** [Experimental Studies on Equine Piroplasmosis. First communication. Cross Inoculation Tests with *Nuttallia equi* and *Piroplasma caballi*.]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipzic,* xxiii, no. 7, May 1919, pp. 121–135, 4 charts, 1 diagram.

The experiments here described are considered to afford decisive evidence that the causal agents of equine piroplasmosis, *Nuttallia equi* and *Piroplasma caballi*, are distinct.

After infection with *N. equi* the blood of a horse remains infective for at least 14 months, while the blood of a horse infected with *P. caballi* becomes infectious even before the end of the incubation period.

One of the experiments showed that in a horse infected with *N. equi* for a long time and actually suffering from an acute infection with *P. caballi*, the former parasite (*N. equi*) was present, though in an invisible form. *N. equi* is therefore not displaced by *P. caballi.*

du Toit (P. J.). **Experimentelle Studien über die Pferdepiroplasmose. II. Mitteilung. Uebertragungsversuche mit** *Ixodes ricinus* **bei der** *Nuttallia-equi-* **Infektion.** [Experimental Studies on Equine Piroplasmosis. Second Communication. Experiments in the Transmission of *Nuttallia equi* by *Ixodes ricinus.*]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipzic,* xxiii, no. 8, May 1919, pp. 141–147, 2 figs.

These experiments were made to ascertain whether infected horses from the eastern fronts were likely to introduce equine piroplasmosis into Germany.

All attempts to transmit *Nuttallia equi* by *Ixodes ricinus* proved negative, but this must not be taken to mean that this tick is incapable of transmitting the disease. In some of these experiments the ticks did not bite very well, and it is also known that all individuals do not contract the infection. It is possible, though not probable, that further experiments with a larger number of ticks may give positive results.

As the disease is transmitted only by certain species of ticks (which do not occur in Germany) there appears to be no danger of it being spread in that country, provided that the horses from the eastern front are freed from ticks before being brought home.

Taute (M.) & Huber (F.). **Die Unterscheidung des** *Trypanosoma rhodesiense* **von** *Trypanosoma brucei.* [The Differentiation of *T. rhodesiense* from *T. brucei.*]—*Archiv f. Schiffs- u. Trop.-Hygiene, Leipzic,* xxiii, no. 11, June 1919, pp. 211–226, 2 maps.

The introduction to this paper summarises the grounds supporting the view that *Trypanosoma brucei,* the nagana trypanosome of domestic animals, is not pathogenic to man and that it is not identical with *T. rhodesiense,* causing sleeping sickness of man in Northern Rhodesia, Nyasaland, and along the Rovuma River in East Africa. The military operations in East Africa [Tanganyika Territory] offered an almost unique opportunity for testing this theory and Taute considers that the results gained in them furnish additional support of it. Among the thousands of troops and camp followers under von Lettow no cases of trypanosomiasis were observed before the period from February to April 1917, although they had been exposed to attack by *Glossina* since the beginning of the War at least and all the transport animals soon became infected with nagana.

Epidemiological observations are given relating to eight different foci of *T. rhodesiense* north and south of the Rovuma River separating ex-German from Portuguese East Africa. Of these, three that were previously unknown are located at the Kiulimila water-hole (situated about 2 days march north of the Liwale-Kilwa road and about 150 miles away from the foci on the Rovuma), in the Lukuledi Valley (about 3 days march westwards of Lindi), and on the Lurio River near Kwa Nluku in Portuguese Nyasaland. Furthermore the district between Nangware and Mtarika-Chirumba on the Lujenda River that had been suspected of being infected was definitely proved to be so. (According to verbal information from English Medical officers another focus of *T. rhodesiense* exists about 18 miles inland from Port Amelia.) In all these foci human trypanosomiasis was of old standing, as proved by the occurrence of cases immediately after occupation by the troops, but the disease had not been noticed before. This shows the great value of systematic travel by medical specialists and its superiority to professional work in the stations, for the damage resulting from a tardy discovery of an epidemic or endemic is seldom reparable.

As the distribution of *Glossina morsitans* practically coincides with that of *T. brucei* it follows that the comparatively small foci of *T. rhodesiense* are included in the large areas of distribution of *T. brucei*, but the epidemiological observations referred to—which agree with the authors' previous assumption—show that the distribution of *T. rhodesiense* must be distinguished from that of *T. brucei*. At the Kiulimila water-hole and on the Lukuledi River the former trypanosome is restricted to the road along which the infected plantation labourers from the Rovuma River travel, whereas *T. brucei* is spread over a territory of several hundred square miles. It is remarkable that the newly discovered foci occur near rivers or lakes just as is the case in the Luangwa Valley (North-eastern Rhodesia), in British Nyasaland and on the Rovuma River. This invites comparison with the distribution of *T. gambiense*, but the authors think it probable that in the case of *T. rhodesiense* the preference for water is due to the circumstances connected with the movements of man and not to the biology of *Glossina morsitans*. During the dry season the tsetse-fly regions are usually very parched and lines of communication run near important streams. It is especially at fords that conditions are favourable to the establishment of foci. It is also possible that, as observed by Lloyd, the pupation of *G. morsitans* is very abundant at fords or other chief points of traffic, so that the flies congregate there.

A remarkable series of experiments were made to test the identity or non-identity of *T. rhodesiense* with *T. brucei*. In the first experiment Dr. Taute and 10 native criminals were the subjects, and injections of *T. brucei* proved negative. The same result attended a further five experiments in different localities, the subjects including both of the authors of this paper and 129 native carriers. The latter belonged to 11 different tribes; some came from districts where *T. rhodesiense* is endemic and both sickly and healthy individuals were included. The animals used, four horses and two mules, were naturally infected. No laboratory strains were employed. These six experiments agree with Taute's pre-war ones and are held to confirm the correctness of the view held by Kleine and others that *T. rhodesiense* and *T. brucei* are not identical.

Little or no success has hitherto attended measures directed against the widespread nagana of animals and only two alternatives are possible, either to give up the struggle or to adopt vast and far-reaching measures of which the ultimate success remains doubtful. These views applied to human sleeping-sickness so long as it was regarded as the same disease. If however it is to be considered distinct, all that seems required is the application against *T. rhodesiense* of the comparatively simple measures that have been suggested against *T. gambiense.* All foci of infection must be mapped, cases must be isolated, and traffic in and out of infected or suspected centres must be watched or even suspended. Much cannot be expected from treatment of the disease, as *T. rhodesiense* shows a great resistance to drugs in many cases.

Of the highest importance is the vexed question as to the part played by game and domestic animals in carrying infection. *T. rhodesiense* is pathogenic to all domestic animals. According to Kinghorn and Yorke up to 16 per cent. of the game of the Luangwa Valley harbour this trypanosome. Exception is taken to this statement, which is said to be quite unfounded and apt to engender false or exaggerated ideas, but the authors consider that game may in certain circumstances act as a carrier of *T. rhodesiense.* All-round destruction of game is however unnecessary and impracticable. The British Inter-Departmental Committee's recommendation for the limited destruction of game is quoted with approval. The ideal would be the radical extermination of *Glossina morsitans,* and while this is impossible throughout the areas infested with this fly, it can be done in sleeping-sickness areas. As time goes by the fly will be gradually pushed back as more land comes under cultivation.

MacGregor (M. E.). **A new Mosquito of the Genus *Orthopodomyia* from a Beech Tree-Hole in England.**—*Jl. R.A.M.C., London,* xxxiii, no. 6, December 1919, pp. 451–454, 1 plate, 1 fig.

*Orthopodomyia albionensis,* sp. n., is described from larvae collected from a hole in a beech tree in Epping Forest, and is the only species of this genus yet recorded from England.

MacGregor (M. E.). **A Method of preventing the Stranding of Mosquito Ova while hatching.**—*Jl. R.A.M.C., London,* xxxiii, no. 6, December 1919, p. 493, 1 fig.

A method of constructing and applying cork harbours to prevent the stranding of mosquito ova while hatching under artificial conditions is described and illustrated.

Edwards (F. W.). **Mosquito Notes.**—*Bull. Entom. Research, London,* x, no. 2, January 1920, pp. 129–137, 1 fig.

The new mosquitos here described include—*Ochlerotatus antipodeus,* from New Zealand; *O. lepidonotus,* from Macedonia, resembling in some respects *O. rusticus,* Rossi, which was taken at the same time and place; *O. (Finlaya) echinus* from Macedonia, Morocco and Algeria, though the Moroccan and Algerian specimens are somewhat doubtfully conspecific with the type; the characters differentiating this species from *O. geniculatus,* Ol., are described; the larval forms are also very different; *Culex watti,* from the Gold Coast and East Africa, and more closely related to *C. duttoni* than to any other African species; *Theobaldia arctica*, from North Russia and closely related to *T. alaskaensis*, Ludl., with which it may be identical; and *T. indica*, from the Punjab.

Other species the synonomy of which is discussed are *Anopheles hyrcanus*, Pallas (*sinensis*, Wied., *pictus*, Lw., *pseudopictus*, Grassi). Pallas' brief description is quoted. Although no collections of mosquitos have been made since Pallas' time in the North Caspian region, it is unlikely that any species other than *A. sinensis* to which the description could possibly apply, occurs there; the name *hyrcanus* must therefore be substituted for the generally used *sinensis*.

*Anopheles subpictus*, Grassi, described in 1899, clearly indicates *A. rossi*, Giles, and the fact that Grassi's description was drawn from a specimen sent by Ross from Calcutta removes any doubt that might exist on this point. Unfortunately, therefore, the rule of priority prevents the commemoration in nomenclature of the work of Sir Ronald Ross.

*Ochlerotatus caspius*, Pallas, has the following synonyms, *Culex dorsalis*, Theo. (? *nec* Meig.), *Grabhamia subtilis*, Ed. & Et. Serg., *G. willcocksi*, Theo., *G. longisquamosa*, Theo., *Mansonia arabica*, Giles, *Culex arabicus*, Beck., ? *C. maculiventris*, Macq., *C. pulchripalpis*, Theo. (*nec* Rondani), and *C. penicillaris*, Rond. It is doubtful whether *C. dorsalis*, Meig., has been correctly determined by Theobald and others and therefore *caspius*, Pallas, is suggested for the insect hitherto recorded under this name. Pallas' description is short and rather vague, but as he mentions the species being abundant and vicious in the marshes of the North Caspian it is probable that he was dealing with one of the common European salt-marsh breeders. His description indicates the present species rather than *O. curriei*, Coq., while definitely excluding *O. salinus*, Fic. This conclusion is confirmed to some extent by the recent discovery of *O. dorsalis*, Theo., in the South Caspian region. Large series of this species have recently been taken in Italy, Macedonia, Palestine, Egypt and Mesopotamia.

*O. curriei*, Coq. (*Culex onondagensis*, Felt, and possibly *C. punctatus*, Meig., *C. dorsalis*, Meig., and *Grabhamia broquettii*, Theo.) appears to be a distinct species from the insect usually known as *dorsalis* and from *O. salinus*, in company with which it was taken. The characters separating it from *O. caspius*, Pallas (*dorsalis*, auctt.) are given. Meigen's descriptions of *C. punctatus* and *C. dorsalis* do not apply very well either to *O. caspius* or to *O. curriei*, though they almost certainly refer to one or the other, probably to the latter. An examination of the types is necessary to settle this point.

Synonyms given for *O. rusticus*, Rossi, are *Culex pungens*, R.-D., *C. quadrimaculatus*, Macq., and *C. diversus*, Theo.

In the case of *Culex apicalis*, Adams, (*territans*, H., D. & K., *nec* Wlk., *hortensis*, Edw., *nec* Ficalbi, *saxatilis*, Dyar, and *pyrenaicus*, Brölemann), the difference between the European and North American forms is so minute that it is negligible. The species is easily distinguished from *C. hortensis*, Fic. The larvae of both were recently taken in the neighbourhood of Salonica, and it is evident from a study of the material that the larva figured by Schneider is that of *C. apicalis* and not of *C. hortensis*.

*Culex aurantapex*, Edw. (*Taeniorhynchus domesticus*, Leic., *nec Culex domesticus*, Germ.) was described from a single female from Nairobi. Further specimens of both sexes have now been received from Dar-es-Salaam and these are apparently identical with the Nairobi example; they agree in every respect with Leicester's *T. domesticus.* It is considered that these examples are specifically distinct from *C. bitaeniorhynchus.*

New varieties of known species include *Stegomyia fasciata* var. *atritarsis*, n., from the Gold Coast; and *Ochlerotatus caspius* var. *hargreavesi*, n., from Italy.

MACFIE (J. W. S.). **The Chaetotaxy of the Pupa of** *Stegomyia fasciata*.—*Bull. Entom. Research, London*, x, no. 2, January 1920, pp. 161–169, 4 figs.

The contents of this paper are indicated by its title, the data having been taken from ten examples of the pupa of *Stegomyia fasciata.*

GUNASEKARA (S. T.). **Report on the Anti-Malarial Campaign at Kurunegala.**—*Indian Med. Gaz., Calcutta*, liv, no. 12, December 1919, pp. 471–472.

The results of the anti-malarial measures in Ceylon here described show that rice fields are the chief breeding-places of Anophelines; at least five of the species found in them have proved to be malaria carriers. The only way to prevent the breeding of Anophelines in these fields is to replace the rice by dry crops such as coconuts. Minor works alone, however long continued, are not sufficient to eradicate local malaria.

The mosquitos captured during the campaign include *Anopheles* (*Myzorhynchus*) *barbirostris*, Wulp; *A. subpictus*, Grassi (*Nyssomyzomyia rossi*, Giles); *A. hyrcanus*, Pallas (*Myzorhynchus sinensis*, Wied.); *A.* (*Myzomyia*) *culicifacies*, Giles; *A.* (*Nyssorhynchus*) *fuliginosus*, Giles; *A.* (*N.*) *jamesi*, Theo.; *A.* (*Nyssomyzomyia*) *punctulatus*, James & Liston; *A. maculatus*, Theo; *A. aconitus*, Dön. (*albirostris*, Theo.) and *A. listoni*, Liston.

BRANFORD (R.). **Note on an outbreak of Surra at the Government Cattle Farm, Hissar, and on Cases treated.**—*Agric. Jl. India, Calcutta*, xiv, no. 5, October 1919, pp. 762–773.

Several cases of surra in ponies and donkeys are reported from Hissar, where the disease has not been previously recorded.

The virus was probably derived from camels of the Government camel corps stationed in this district in 1917 and transmitted by Tabanids; *Stomoxys, Lyperosia* and Hippoboscids were also very abundant, especially from August to October. In equine surra the period of incubation in natural cases is thought to exceed 10 days. Attention is drawn to the fact that foals did not contract the disease even though still unweaned from an infected mare.

Details are given of the treatment of various animals, chiefly with soamin and antimony tartrate, the results of which are said to be distinctly encouraging.

AUSTEN (E. E.). **Anti-Mosquito Measures in Palestine during the Campaigns of 1917-1918.**—*Trans. Soc. Trop. Med. Hyg., London,* xiii, no. 4, 21st November 1919, pp. 48–60.

The anti-mosquito work carried out during the campaign of 1917–18 in Palestine, of which details are given, included the usual measures such as draining and oiling of pools, importation of fish (*Tilapia nilotica*) and preventive prophylaxis.

The species observed include *Anopheles turkhudi*, List.; *A. bifurcatus*, L.; *A. algeriensis*, Theo.; *A. maculipennis*, Mg.; *A. hyrcanus*, Pall. (*sinensis*, Wied.); *A. pharoensis*, Theo.; *A. mauritianus*, Grp.; *A. palestinensis*, Theo.; and *Culex pipiens*, L. The topography of the various districts is discussed. The majority of pools and small streams are choked with a green alga (*Spirogyra*) in which Anophelines are extremely abundant. Anophelines were also found breeding in the wells in the orange groves, the village cisterns and marshes. In the marshes a snail (*Bullinus contortus*), the intermediate host of *Schistosomum haematobium*, was found to be abundant.

In nearly all cases the measures undertaken proved successful, but were probably not permanent.

The paper concludes with some recommendations with regard to anti-mosquito work on active service.

BULL (L. B.). **A Contribution to the Study of Habronemiasis: a Clinical, Pathological and Experimental Investigation of a Granulomatous Condition of the Horse.—Habronemic Granuloma.**—*Trans. R. Soc. S. Australia, Adelaide,* xliii, 1919, pp. 85–141, 3 plates. [Received 7th January 1920.]

Evidence indicates that *Musca domestica* (house-fly) acts as the intermediate host of certain species of *Habronema*, a Nematode of which the larva gives rise to a granulomatous condition generally affecting the external mucous membranes of the horse in South Australia. When deposited on the external mucous membrane the larvae are apparently able to penetrate to the submucosa; when present in some lesion of the skin or in a puncture wound made by *Stomoxys calcitrans* or some other biting fly the moisture necessary to the larvae is probably supplied by an exudation of blood or serum.

An account is given of the life-histories of the three species of *Habronema*, *H. muscae*, *H. megastoma* and *H. microstoma* [*R.A.E.*, B, vii, 118]. From a study of these it appears that the larvae generally responsible for production of lesions are those of *H. megastoma*, though the other two species also may be implicated. The granuloma commonly called swamp cancer which affects horses in Northern Australia is essentially the same and is possibly due to larvae of *H. microstoma* inoculated by *S. calcitrans*. The granulomatous conditions common in horses and asses in all parts of the world and known as "summer sores" or "granular dermatitis" has the same aetiology as the granulomata observed in South Australia. The aetiology of the tumours known as "leeches" in North America and "bursattee" in India is somewhat obscure; these again may be similar to habronemic granulomata.

Prophylaxis should be directed to ridding animals of the adult Nematodes in the stomach and to the destruction of horse dung or its use in agriculture. The second method is likely to prove more successful than the first. Excision of the lesion is the best treatment, but should this be impossible the surface should be covered by some application to protect it from further infection by flies.

FROGGATT (W. W.). **Destruction of Bugs by Fumigation.**—*Agric. Gaz. N.S.W., Sydney,* xxx, no. 11, November 1919, p. 828.

For the destruction of bugs [*Cimex*] by fumigation with hydrocyanic acid gas, the quantities that have been found efficient for 1,000 cubic feet are 1 lb. cyanide, 1 lb. (liquid measure) sulphuric acid and 48 oz. water. The usual formula in a smaller space such as an airtight room is 1 : 1 : 3 in ounces. The method of fumigation is described.

WILLIAMS (T. H.). **Lice and Mange Infection of Pigs.**—*Queensland Agric. Jl., Brisbane,* xii, no. 5, November 1919, p. 262.

The hog louse, *Haematopinus suis,* is believed to be responsible for many cases of swine fever in Queensland. Methods of destroying this pest and the treatment of mange in pigs as a result of the presence of *Sarcoptes scabiei suis* are described [*R.A.E.*, B, vi, 170 ; vii, 175].

TOWNSEND (C. H. T.). **New Genera and Species of Muscoid Flies**——*Proc. U.S. Nat. Mus., Washington, D.C.,* lvi, no. 2301, 1919, pp. 541–592.

This list includes descriptions of 77 new genera and 78 new species. Villeneuve having shown that *Phormia regina,* R.-D. (*nec* Meig.) which was the type of the genus is a synonym of *P. azurea,* Fall., a new genus *Euphormia* is here erected for *regina,* Meig., which is generically distinct from *P. azurea,* Fall.

DE SALLES GOMES (F.). **Prophylaxia do Impaludismo em Villa Americana, Nova Odessa, Carióba e Salto Grande.**—*Serviço Sanit. Estado de São Paulo* [*Brazil*], N.S. no. 9, 1919, 123 pp., 67 figs., 1 plate, 1 map. [Received 7th January 1920.]

This paper describes the anti-malarial measures carried out in some localities of the Brazilian State of S. Paulo.

**Como destruir o "Bicho dos Pés."** [Measures against *Dermatophilus penetrans.*]—*Chacaras e Quintaes, S. Paulo,* xx, no. 6, 15th December 1919, p. 477.

Ichthyol ointment is advised against *Dermatophilus* (*Sarcopsylla*) *penetrans* infesting the feet of pigs. The styes after disinfection should be strewn with *Chenopodium ambrosioides.*

DEL CASTILLO (E.). **Informe sobre los Medios de Destrucción de la Garrapata en la República Argentina.** [Tick Eradication in Argentina.]—*Rev. Agrícola, Bogotá,* v, no. 2, February 1919, pp. 73–74. [Received 15th January 1920.]

For the purpose of tick destruction Argentina is divided into three zones ; infested, intermediate and immune. The first comprises the central and northern portions of the country, reaching up to 33° south latitude; the intermediate zones lies to the south of the former and separates it from the immune territory. Dipping is the recognised remedial method.

Swellengrebel (N. H.) & Swellengrebel-de Graaf (J. M. H.). **On the Requirements of different Anophelines in Regard of the Abode of their Larvae.**—*Meded. Burgerlijk. Geneesk. Dienst Nederl.-Indië, Batavia,* 1919, no. 7, pp. 39–85, 1 chart.

In a previous paper [*R.A.E.*, B, vii, 97] the authors stated the three premises on which the practical value of the specific distinction of Anophelines is based. The third premise is that different breeding-grounds are necessary to the various species and this point is dealt with here. For the purpose of enumerating the breeding-places the mosquitos have been divided into salt-water species, hill species, species not limited to distinct bounds, and shade-preferring species.

Salt-water species. On the coasts of Java and Sumatra the dependence of *Anopheles ludlowi* on salt-water is quite pronounced. This dependence on distinct breeding-places is still more marked in the valleys with fishponds in N.W. Sumatra [*R.A.E.*, B., vii, 99], which is remarkable in that the change from salt-water to the fresh water ponds would seem greater than from the ponds to a marsh watered by them and in which many other Anophelines breed. Some observations appear to show that unfavourable conditions in the salt-water breeding-places may force *A. ludlowi* to inhabit water with no brackish taste. This and other facts point to caution in holding that *A. ludlowi* is limited to a distinct area. The destruction of recognised breeding-places may cause this species to use others that were previously neglected. Attention is drawn to an observation made by Schüffner about 20 years ago, when several examples of *A. ludlowi* obtained from the coast escaped in the course of some experiments and deposited eggs in a fresh-water pool inland. Breeding continued for some generations and then ceased. The presence of coastal *A. ludlowi* in fresh water does not therefore necessarily mean that its larvae have become quite independent of salt water and this also holds good for *A. ludlowi* from inland fishponds. *A. rossi* (by which is meant the form with larvae like those of *A. ludlowi*, with long posterior clypeal hairs and long lateral clypeal hairs) has a distribution corresponding somewhat to that of *A. ludlowi*, but does not posses the latter's partiality for special breeding-places. For instance, where *A. ludlowi* disappeared from certain fishponds from October, *A. rossi* remained in undiminished numbers. In the municipality of Samarang, *A. rossi* has been found in the low lands, at the foot of the hills and in the hills, and this in rice-fields, dirty water ditches, clear running brooks with algae, small marshes at the foot of the hills, brick reservoirs devoid of vegetation, and fresh water in a boat. The places farthest inland were about 4 miles from the coast and at about 300 feet altitude.

Hill mosquitos. *A. maculatus* was found regularly near hills and mountains, but never occurred at any great distance from them, even in clear, running water. Breeding-places include foot-prints, fishponds, rice-fields, swamps, reservoirs, buffalo wallows, etc. It is almost as little fastidious as *A. indefinitus* and *A. kochi*, but only takes to such breeding-places in the vicinity of existing (or lately existing) ones that were more favourable. The supposition is that temporarily its adaptiveness is rather marked, but limited, and that it could not survive if prevented from returning to more favourable conditions from time to time. It is found at altitudes between sea-level and 5,000 feet. *A. karwari* up till now has not been found in the breeding-places of *A. maculatus*, though the habitats of these two species have many points in common. Of *A. aconitus* there appear to be two types [*R.A.E.*, B., vii, 184]. The typical larvae only give rise to typical *A. aconitus*. From the variety, the typical form, *A. aconitus* var. *cohaesa minima* and transitional forms between them have been bred. A list of breeding-places is given for both forms, the main difference being that the typical form, but not the variety, was found in brooks and springs. It would seem that while the typical *A. aconitus* is more or less confined to the hills, this is not so pronounced as in the case of *A. maculatus* ; the variety is more like *A. maculatus* in this respect. The data concerning *A. minimus* are too scanty to form any definite opinion as to its breeding-places, but they appear to be similar to those of the varietal form of *A. aconitus*. *A. aitkeni* should be included among the hill-species, so far as present knowledge goes. In the larval state it appears to be the most localised of all hill-mosquitos. It ranges in altitudes from low hills to about 5,000 feet.

Species not limited to distinct bounds. *A. indefinitus* is found at all altitudes between sea-level and about 3,000 feet. In localities where *A. hyrcanus* (*sinensis*) occurs it is generally common ; its breeding-places are very varied in character, but very dirty and muddy water is avoided—contrary to what obtains with *A. indefinitus* —so that it was not found in ploughed rice-fields, road-pools and waggon ruts. The larvae of *A. barbirostris* are more common than those of *A. hyrcanus*, which is rather surprising, because in places such as buffalo and cow sheds, where the latter occurred also, its imagines outnumbered those of the former species. *A. barbirostris* ranges from sea-level to about 2,000 feet. *A. fuliginosus* avoids dirty water even more than *A. hyrcanus* and *A. barbirostris* do ; if the water is clear, other requirements are of no importance. Its range is from sea-level to about 2,000 feet. *A. kochi* resembles *A. indefinitus* in that it does not object to even very dirty water for its breeding-places. *A. punctulatus*, like *A. kochi* and *A. indefinitus*, is a dirty-water mosquito, but like them it also occurs in clear water. Its altitude range is from sea-level to about 2,000 feet. *A.* (*Nyssorrhynchus*) *annulipes* var. *moluccensis* is only found in the Malay Archipelago east of Celebes. Its larva has the widest range of breeding-places known. No other is so indifferent as to whether the water is salt, brackish or fresh, or whether the breeding-places are near the coast or not. It also adapts itself to such artificial breeding-places as water in boats, and seems quite indifferent to the degree of pollution of the water.

Species exhibiting a preference for shade. *A. umbrosus* was never found in rice-fields ; otherwise no special condition for the breeding-place seems to be required, for it occurs in salt and fresh water, both on the coast and away from it. There is a certain preference for shady situations, but this is not always exhibited. Very dirty breeding-places seem to be avoided. Very few data were collected regarding *A. albotaeniatus* and no conclusions could be reached regarding it. *A. leucosphyrus* is a very local species; some shade appears to be sought for, but no other special preference was detected.

From the above data the following conclusions are obtained. Specific sanitation (on the lines known at present) is not adapted for combating Anophelines of the hills, ubiquitous, or shade-preferring species, because they have no specialised demands regarding their breeding-places and the destruction of these would interfere too much with economic life. General sanitation, *i.e.*, the destruction of all actual and potential breeding places of *all* Anophelines, appears at present to be the only means that can be recommended. In view of its special breeding-places and also on acccount of its dangerous character, *A. ludlowi* might be the subject of special measures such as the destruction of its salt-water breeding-places. This should, however, be done as an experiment.

SWELLENGREBEL (N. H.). **Een Opmerking over de Terminologie bij de Beschrijving van Anophelinenlarven.** [A Remark on the Terminology used in describing Anopheline Larvae.]—*Geneesk. Tijdschr. Nederl.-Indië, Batavia,* lviii, no. 6, 1918, pp. 1010–1012. [Received 19th January 1920.]

Up to recent years there has been no Dutch terminology for describing Anopheline larvae. The author and Dr. Schüffner have used a number of terms, and as Dr. Mangkoe Winoto has published a paper [*R.A.E.*, B, vii, 76] with a different terminology, it is thought advisable to show the differences in a table. The author adds that Schüffner and himself have always taken full-grown larvae for description and that in the case of unknown larvae it is necessary to breed the adult before attempting to determine the species.

SWELLENGREBEL (N. H.). **Eenige voor Nederl.-Indië nieuwe Anophelinen.** [Some Anophelines new to the Dutch East Indies.]—*Geneesk. Tijdschr. Nederl.-Indië, Batavia,* lix, no. 1, pp. 1–12, 1 plate. [Received 19th January 1920.]

This paper is intended to complete two previous ones by Schüffner and Swellengrebel (*Geneesk. Tijdschr. Nederl.-Indië, 1914*), and by Schüffner and van der Heyden [*R.A.E.*, B, v, 27], describing the Anophelines occurring in the Dutch East Indies and to furnish a key which includes the species recently recorded.

The following notes refer to some of the species dealt with. *Anopheles* (*Myzorhynchus*) *argyropus*, Swell., must be regarded as a synonym of *A. mauritianus*, Gr. *A. sinensis*, Wied., embraces many species, and some or all of them may be reinstated as a result of investigation; for the present they must remain under the above name. *A. aconitus*, Dön., is a variety of *A. minimus*, Theo., *A.* (*Neomyzomyia*) *punctulatus*, Dön., is a synonym of *A.* (*N.*) *tessellatus*, Theo.; *A.* (*Myzomyia*) *indefinitus*, Ludl., is no longer considered a variety of *A. rossi*, Giles. *A. ludlowi* has more claim to be treated as a variety of *A. rossi*, but it is however better to treat it also as distinct species. *A. rossi*, itself, though it occurs in many parts of Java, has not been found in Sumatra. *A.* (*M.*) *flavus*, Swell. [*R.A.E.*, B, vi, p. 214] is distinguished from Anophelines of the *Stethomyia* group by the presence of normal broad fork-scales and by its attitude when at rest, which resembles that of *Anopheles*. *A.* (*Nyssorhynchus*) *jamesi*, Theo., or a very closely-allied species, has been found by Darling at Weltevreden (Batavia). The larva of *A.* (*Stethomyia*) *aitkeni*, James, is found rather commonly in Java and Sumatra, though the adult is very seldom met with. Further characters of the following species are described: *A.* (*Myzomyia*) *minimus*, Theo., *A.* (*Nyssorhynchus*) *fuliginosus* var. *nivipes*, Theo., and *A.* (*Mysorhynchus*) *barbirostris* var. *pallidus*, n.

SENEVET (G.). **Longueur du Vol, sans Arrêt, d'un Moustique sur une Distance supérieure à mille Metres.**—*Bull. Soc. Hist. Nat. de l'Afrique du Nord, Algiers*, x, no. 8, 15th November 1919, pp. 185–186. [Received 20th January 1920.]

It is reported that larvae of *Culex* (*Acartomyia*) *mariae*, Ed. & Et. Sergent, were found in rock crevices containing brackish water about 13 feet above sea-level on an island off the Algerian coast. As the larvae were about a fortnight old and there is apparently no possible means of artificial transportation, it is thought that the adults must have travelled a distance of over a kilometre across the open sea from their nearest known habitat.

GOBERT (A.). **Notes Vétérinaires.**—*La Vie Agric. et Rur., Paris*, xvi, no. 2, 10th January 1920, p. 36.

The usual formulae for cattle dips in the treatment of mange and insecticidal powders for use against lice and fleas on domestic animals and poultry are given.

STOCKMAN (Sir S.). **Louping-ill. Duration of the Infectivity of the Ticks.**—*Jl. Comp. Path. Therapeut., London*, xxxii, no. 4, 31st December 1919, pp. 283–285.

The question of duration of infectivity of the tick [*Ixodes ricinus*] with louping-ill has been discussed in previous papers [*R.A.E.*, B, vii, 17, 147]. It was demonstrated, before the tick was proved to be the carrier of infection, that if infected pastures were kept free from sheep for a year the disease reappeared upon re-stocking. It was therefore presumed that the duration of infectivity is probably as long as the life of the tick in the stage of its life-cycle in which it is infective.

Experiments that have recently been carried out and are here described confirm the hypothesis that ticks engorging as nymphs on acutely infected sheep become carriers of infection after moulting to the adult stage. The investigations also indicate that the infecting agent is not fully developed within the tick until a certain time after the moult is completed. It is evident therefore that measures of eradication based upon the method of starving the ticks are impracticable on account of the long period during which pastures would have to be left idle.

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HORNBY (H. E.). **Tsetse Fly Disease in Domestic and Wild Animals.**—*Rhodesia Agric. Jl.*, *Salisbury*, xvi, no. 6, December 1919, pp. 493–500, 3 figs.

The inter-relations of game, tsetse-flies and trypanosomes are discussed. An explanation of the marked decrease in the numbers of *Glossina* following upon the great outbreak of rinderpest of the end of last century is quoted. The author quotes the explanation of this phenomenon suggested by Mr. C. F. M. Swynnerton, viz.:—that during the winter months the fly areas contract to those affording sufficient shade, and if during this season the rinderpest killed off the wandering game, not only would the food supply of the flies be greatly diminished but the carriers also would be destroyed [see also *R.A.E.*, B, vii, 10].

It is thought that while trypanosomes have adapted themselves to many sorts of blood, their mammalian hosts have also acquired a certain immunity against them ; in fact, there is reason for believing that trypanosomes do not thrive well in the blood of game, but soon die out in it when the game leave the fly-belts. When domesticated animals are attacked they offer no resistance by means of anti-bodies such as the game possess and so are frequently killed outright by the disease. The most they can do as a rule is to retard the progress of the disease to the extent of rendering the condition chronic. The majority of trypanosomes cannot survive in human blood because they have not become adapted to it, but in those parts of Africa where tsetse and man have associated for many decades this has occurred and sleeping sickness has been the result.

The summary of a recent paper by the author on trypanosomes in domesticated animals is quoted in full [*R.A.E.*, B, vii, 111]. While all domestic animals are susceptible to trypanosomiasis, cattle are naturally immune to *T. brucei* and dogs to *T. vivax*. Local races of animals may develop a high degree of resistance to local strains of the disease ; adult animals are usually the first to succumb. The method of infection and the general nature of the disease are discussed.

As tsetse-flies do not travel far from undergrowth on a dark night, when moving cattle it is well to choose a cold, rainy night and to keep the cattle in the middle of broad roads. If night travelling is impossible, an open space should be chosen where the cattle can be close herded during the day-time. Smudge fires around a small grazing ground should be made. If the number of animals is small, a spray of ½ lb. soap and 2 gals. paraffin to 23 gals. of water should be applied before the belt is entered. Dogs should be carried in fly-proof crates ; horses should be rugged, hooded and bandaged as well as sprayed and they should travel by day with a boy carrying a fly-switch.

The drugs that have proved most efficacious are orpiment, tryparosan and tartar emetic. The dose of the first for an ox is one drachm, given as an electuary. The dose of tryparosan is two drachms, given subcutaneously ; of emetic, one gramme given intravenously. A combination of two or three of these drugs will be effective against any but the most severe infections of *T. congolense* or *T. vivax*. Disease caused by *T. brucei* is at present incurable. Routine treatment is being tried of six intravenous injections of 25 c.c. of a 4 per cent. watery solution of tartar emetic at 5 days intervals ; the results will be published later.

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Sheather (A. L.). **A Malarial Parasite in the Blood of a Buffalo.**—*Jl. Comp. Path. Therapeut., London,* xxxii, no. 4, 31st December 1919, pp. 223–229, 2 plates.

The occurrence of malarial parasites in the blood of ruminants has not apparently been previously recorded except by Bruce, who discovered two infected antelopes in Nyasaland in 1913 [*R.A.E.*, B, i, 99]. The author of the present paper records the finding of the parasite in blood-smears taken in India from a plains buffalo after death. The morphology of the organism is described and shows it to be quite distinct from that recorded by Bruce. There was no regular periodicity of the fever produced. An examination of the blood corpuscles showed 1·6 per cent. containing parasites. Should the parasite prove to be a new one, the name suggested for it is *Plasmodium bubalis.*

A further case of malarial infection in the buffalo has been discovered since the above paper was written.

Johnston (T. H.). **Control of the Cattle Tick.**—*Science & Industry, Melbourne,* i, no. 7, November 1919, pp. 419–425, 2 figs.

The bulk of the information contained in this paper on the control of *Boophilus annulatus* has been noticed elsewhere [*R.A.E.*, B, vii, 12].

Loftin (U. C.). **Mosquitoes found about Gainesville, Fla. Part 1: Species, Breeding Places, Mosquitoes and Disease, Natural Enemies, Preventives.**—*Florida Buggist, Gainesville,* iii, no. 2, September 1919, pp. 17-23 & 28–29, 4 plates. [Received 22nd January, 1920.]

An account is given of the mosquitos occurring in Florida, which include *Culex fatigans*, Wied. (*quinquefasciatus*, Say), *Anopheles crucians*, Wied., *A. quadrimaculatus*, Say, *Stegomyiafasciata*, F. (*calopus*, Meig.), *Psorophora ciliata*, F., *P. floridensis*, D. & K., and *Megarhinus* sp. The various stages are described and their life-histories, breeding-places and habits are discussed. A later paper will deal with remedial measures.

Scott (H.). **Notes on the Biology of *Necrobia ruficollis*, Fabr. (Coleoptera, Cleridae).**—*Ann. App. Biol., Cambridge,* vi, no. 2–3, December 1919, pp. 101–105, 2 figs.

*Necrobia ruficollis*, F., was bred abundantly in the "fly room" at the Imperial College of Science, London, in 1917–18. The temperature ranged between 70° and 80° F. (about 21° and 27° C.) with extremes of 64° and 89° F. (18° and 32° C.). Breeding and general activity apparently continued regardless of the temperature. The work of previous authors with regard to the diet and behaviour of *N. ruficollis* and allied species is reviewed.

The present observations show that the larvae are usually saprophagous and only with great difficulty were induced to kill and eat fly maggots. Pupation occurs in any suitable existing cavity, especially in the interior of a fly puparium, for which purpose a cell is made by the larva. Pupation does not occur immediately after completion of the cocoon, and the adult may remain in the cell for several days after transformation. The duration from the making of the cocoon to the emergence of the adult was about 20 days. The food of the adults is similar to that of the larvae.

**The Warble Fly.**—*Jl. Minist. Agric., London,* xxvi, no. 10, January 1920, pp. 995–997, 1 plate, 4 figs.

A popular account is given of the life-history and habits of the two species of warble flies known in the British Isles, *Hypoderma bovis* and *H. lineatum*, which together are responsible for a loss of about £500,000 annually in damaged hides alone.

It is not considered that there is much value in the various washes and smears recommended for summer use. Some protection may be afforded by giving the cattle access to shade and water in which they can stand. One and two year-old bullocks and heifers are more subject to attack than young calves, and calves more than milch cows. The only known method of exterminating the pest is by squeezing out the mature larvae by hand from the skin of the animal and destroying them. This should be done from February until the end of June. When several maggots are removed from a small area of skin it is advisable to apply carbolic oil. Dips and ointments may be of some value, but none is yet known that is deadly to the maggot and harmless to cattle. Cattle owners are urged to co-operate in killing as many of the larvae as possible. It is considered that if farmers would all take the necessary steps for two or three years the insects would be almost exterminated, while the higher value of the animals would soon compensate for the trouble taken in eradicating the pest.

Ludlow (C. S.). **New Siberian Culicidae (Diptera).**—*Insecutor Inscitiae Menstruus, Washington, D.C.,* vii, no. 10–12, October-December 1919, pp. 151–161.

*Theobaldia* (*Culiseta*) *siberiensis*, sp. n., *Aëdes grahami*, sp. n., and *A. cyprius*, sp. n., are described from central and eastern Siberia.

Dyar (H. G.). **Descriptions of hitherto unknown larvae of** *Culex* **(Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.,* vii, no. 10–12, October-December 1919, pp. 161–162.

The larva of *Culex* (*Choeroporpa*) *peribleptus*, D. & K., is described from individuals taken from grass growing along the margin of a pond in Mississippi.

Bonne-Wepster (J.) & Bonne (C.). **Diagnoses of new Mosquitos from Surinam, with a Note on Synonymy (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.* vii, no. 10-12, October-December 1919, pp. 165–180.

The new species here described are:—*Sabethoides imperfectus* attacking man; *Lemmamyia* (*Limatus*) *pseudomethysticus*, *Dendromyia roucouyana*, *Cleobonnea argenteorostris* and *Hystatomyia lamellata*, all bred from Bromeliaceae ; *Prosopolepis flui* captured in woods ; *Culex* (*Carrollia*) *secunda*, suggested for examples from Panama closely resembling *Culex* (*Carrollia*) *iridescens*, Lutz, although the larvae and male genitalia differ ; *Culex* (*Carrollia*) *infoliata*, the larvae of which live in tree-holes ; *Culex brevispinosus* ; *Culex* (*Choeroporpa*) *alcocki* ; *C.* (*C.*) *saramaccensis*, of which the larvae were found in rock-pools ; *C. albinensis* and *C. coppenamensis*, the larvae of which were found in ground-pools ; *C. nicceriensis*, bred from larvae taken in ground pools ; *C.* (*C.*) *maroniensis* ; *Culex* (*Melanoconion*) *ensiformis*, larvae of which were found in grassy pools ; *C.* (*M.*) *commevynensis*, bred from a ditch ; *Culex* (*Mochlostyrax*) *curopinensis*, which is common all over the Colony throughout the year ; *C.* (*M.*) *multispinosus*, larvae of which were found in permanent pools ; *Aëdes arborealis*, bred from a tree-hole ; *A. argyrothorax*, captured near a tree-hole near Paramaribo ; *Megarhinus aldrichanus*, bred from ground Bromeliaceae ; and *Megarhinus guadeloupensis guianensis*, subsp. n.

From individuals reared from pupae found in clear water held by a fallen banana leaf it is thought probable that *Sabethes bipartipes*, D. & K., of which only females and *S. chroiopus*, D. & K., of which only males have been found, represent the two sexes of one species.

SAMPIETRO (G.). **Il Tifo petecchiale durante la Guerra europea.**—*Ann. d'Igiene, Rome*, xxix, no. 10, 30th October 1919, pp. 690–707. [Received 27th January 1920.]

The section dealing with direct prophylactic measures against exanthematous typhus mentions various methods of louse destruction. A feature of this paper is a bibliography of nearly 500 references divided under the headings, epidemiology, diagnosis, etc.

SEARLE (C.). **Bilharziasis and Malaria during the Palestine Campaign.** —*Jl. R.A.M.C., London*, xxxiv, no. 1, January 1920, pp. 15–34, 1 map.

Two cases of malignant tertian malaria at a desert post in Sinai in 1916 are recorded as a result of infection by a single mosquito, *Anopheles pharoensis*.

The anti-mosquito work in the vicinity of the river Auja in the spring and summer of 1918 is discussed [*R.A.E.*, B, viii, 51]. Many species of mosquitos are mentioned as being found in this area, including *Anopheles fragilis* and *Theobaldia longiareolata* in addition to those already recorded [*loc. cit.*].

FROGGATT (W. W.). **The Digger Chalcid Parasite** (*Dirhinus sarcophagae*, **sp. n. on** *Sarcophaga aurifrons*).—*Agric. Gaz. N.S.W., Sydney*, xxx, no. 12, December 1919, pp. 853–855, 4 figs.

*Dirhinus sarcophagae*, sp. n., of which the adult is here described, was bred from the pupae of the common flesh-fly, *Sarcophaga aurifrons*, between 1st January and end of February. One individual only emerged from each fly pupa.

CABALLERO (A.). **La *Chara foetida* A. Br., y las Larvas de *Stegomyia*, *Culex* y *Anopheles*.**—*Bol. R. Soc. Española Hist. Nat., Madrid*, xix, no. 8, October 1919, pp. 449–455.

The occurrence of larvae of *Stegomyia* in large numbers in some tanks in which aquatic plants were being reared in the botanical laboratory of the Barcelona University and their absence in others, led to further investigations and experiments. It was found that larvae of *Stegomyia*, *Culex* and *Anopheles* die in pools that contain a certain quantity of the plant *Chara foetida*. The exact quantity necessary to cause the death of all the larvae present has not been determined, but it is evident that in 50 c.c. of water the mass of vegetation must occupy somewhat more than $\frac{1}{8}$ of the space, though this proportion or even less is sufficient to prevent oviposition, and to cause the death of some larvae and hinder greatly the development of others. The effect on all three genera is very similar, though the larvae of *Stegomyia* appear slightly more resistant than the others. *C. foetida* is easy and economical to grow, both in town and country.

The cause of the toxicity to which this plant gives rise clearly lies in the fact that if left uncovered, the surfaces of any water containing the growing plant quickly becomes covered with patches of a thin oily substance, and this within three or four days forms a light film deepening later to about $\frac{1}{2}$ mm. in thickness. It is evident that the presence of this film interferes with the respiration of the larvae.

BRÈTHES (J.). **Sur la *Prospalangia platensis* (n. gen. n. sp.) (Hymen.) et sa Biologie.**—*Anales Soc. Cien. Argentina, Buenos Aires*, lxxix, no. 5–6, May–June 1915, pp. 314–320, 8 figs.

A new Chalcid, *Prospalangia platensis*, gen. et sp. n., is here described. It has been found parasitic upon the pupae of *Musca domestica*, *Stomoxys calcitrans* and other flies in the neighbourhood of Buenos Aires. The larva feeds upon these Diptera within the puparium, where pupation of the parasite also takes place. Although only one parasite is found in each host, the percentage of parasitism, judging from the author's observations, seems to be from 60 to 74 per cent. It is thought therefore that this beneficial parasite may be of considerable use if propagated as a control for *M. domestica*.

JUNGMANN (P.). **Untersuchungen über Schaflausrickettsien** (*Rickettsia melophagi*, **Noeller**). [*Rickettsia* of Sheep Ticks.]—*Deutsche Med. Wochenschr., Leipzic*, xliv, no. 49, December 1918, pp. 1346–1348.

A *Rickettsia*-like organism, *Rickettsia melophagi*, Noeller, is a normal and regular inhabitant of the intestine of the sheep tick [*Melophagus ovinus*]. It differs from the *R. prowazeki* found in *Pediculus humanus* in the following particulars. It can be cultivated on sheep's blood-glucose-agar, whereas up to now the artificial culture of *R. prowazeki* has failed. It is, as a rule, an extra-cellular organism of the cells of the stomach, whereas *R. prowazeki* is intra-cellular. It is a regular intestinal parasite of *Melophagus ovinus* in which infection is transmitted to the eggs, whereas *R. prowazeki* is probably acquired by *P. humanus* when the latter feeds on a typhus-infected man.

Tänzer (E.) & Osterwald (H.). **Ist mit einer weiteren Verbreitung der Malaria in Deutschland zu rechnen oder nicht?** [Is a further spread of Malaria in Germany likely or not?]—*Deutsche Med. Wochenschr., Leipzic*, xlv, no. 25, 19th June 1919, pp. 689–690.

Demobilisation may entail the spread of malaria in Germany. As a result of improved conditions in dwelling-houses mosquitos, *Anopheles maculipennis* and *A. bifurcatus*, have become largely limited to cowsheds and stables, especially those that are dark, dirty and containing spiders' webs.

Prell holds that the practice of keeping goats is dangerous, and it is pointed out that the adults and larvae of *A. maculipennis* have been found in towns as well as in stables and sheds in their proximity. Well-lit, airy and clean stables and sheds will lessen the danger from Anophelines.

von Wasielewski (T.) & Wuelker (G.). **Die *Haemoproteus*-Infektion des Turmfalken.** [The *Haemoproteus* Infection of the Kestrel.]—*Beihefte zum Arch. f. Schiffs- u. Trop.-Hyg., Leipzic*, xxii, Beiheft 2, January 1918, pp. 117–212, 11 figs., 4 plates. [Abstract in *Trop. Dis. Bull., London*, xiv, no. 4, 15th October 1919, p. 207.]

Young kestrels (*Cerchneis tinnunculus*) are probably infected with *Haemoproteus* by a fly, *Carnus hemapterus*, which inhabits the nest; possibly also by Hippoboscidae, but not by *Culex*.

França (C.). **Sur un Piroplasmide des Bovidés de la Côte d'Or** (*Achromaticus macfiei*, **n. sp.**).—Separate from *An. Sci. Faculdade Med. do Pôrto, Oporto*, iv, no. 3, 1918, 12 pp., 1 plate.

In preparations from the blood of a sick cow in the Gold Coast *Piroplasma bigeminum*, *Theileria mutans* and a third parasite, believed by Macfie to be highly pathogenic, and the morphology of which shows a transition between the Haemamoebidae and the Piroplasmidae, have been found. It has a great variety of forms. The author considers it to belong to the genus *Achromaticus*, Gonder, and suggests the name *A. macfiei*.

Hautefeuille (E.). **Assainissement antipaludique à Palikao (Département d'Oran).**—*La Malariologia, Naples*, Series I, xi, no. 5–6, 31st December 1918, pp. 100–107, 4 figs.

This paper describes successful application to the village of Palikao of the measures that have proved entirely reliable in other parts of Algeria.

Susini (A.). **Douze Ans de Campagne antipaludique à Brazza.**—*La Malariologia, Naples*, Series I, no. xi, 5–6, 31st December 1918, pp. 108–110.

All the factors favourable to malaria are present at Brazza, Algeria, and its reputation for unhealthiness has been an obstacle to development. Work on the lines recommended by Sergent, including clearing.

oiling, draining of streams and administration of quinine to the European and native population, proved highly successful at the very low cost of about £20 a year.

SCHAEDEL (A.). **Biologische Betrachtungen zur Frage der Malariarezidive und der Malariaverbreitung.** [Biological considerations on the Question of Malarial Relapses and the Spread of Malaria.] *Biol. Zentralbl.*, xxxviii, 1918, p. 143. (Summary in *Arch. f. Schiffs- u. Trop.-Hyg.*, *Leipzic*, xxiii, no. 11, June 1919, p. 228.)

The author confirms the previous results obtained by Lenz [*R.A.E.*, B, vi, 57]. At Mayence he found amongst 375 relapse cases in 1916 and 1917 that the relapse curve corresponds with that of the average annual temperature. High temperature, dry air, few clouds and strong sunlight are correlated with a large number of relapses. The maximum relapse period was, however, in June, a month before the maximum temperature. Schaedel accepts Schaudinn's theory of parthenogenesis of gametes and assumes that increased stimulus to the gametes causes a more rapid occurrence of the relapse.

*Anopheles maculipennis* is widely distributed in the Rhine region from Basle to Bingen; *A. bifurcatus* also occurs. Ziemann states that no Anophelines occur in the fortified area of Mayence, though they are common in the endemic malarial area of the Mayence basin. The author believes that infection with *Plasmodium praecox* (*falciparum*) cannot occur in Germany, but Mühlens (to whom the present summary is due) remarks that genuine cases have been observed in France and Upper Silesia and does not agree with the view that the typical crescents soon disappear while the gametes of benign tertian malaria are much more resistant.

GEIGER (J. C.) & PURDY (W. C.). **Experimental Mosquito Control in Rice-fields.**—*Jl. Amer. Med. Assoc.*, *Chicago, Ill.*, lxxii, no. 11, 15th March 1919, pp. 774–779.

During 1918 observations in Arkansas, extending over the entire rice-growing season from June to September inclusive, showed that *Anopheles* and *Culex* were present in equal and moderate abundance; breeding was fairly uniform over the entire field, with a slight preference for the more open water along embankments, beginning 10–14 days after flooding and continuing until late in September, when it gradually diminishes. Top-minnows are usually found near the embankments and water-outlets, rarely in mid-field; predatory insect larvae, principally *Hydrophilus*, *Dytiscus* and some dragon-flies, are usually abundant enough to be of some importance as a check.

As a result of the experiments detailed here the conclusions reached are that intermittent flooding as a remedial measure is probably not feasible owing to the additional cost of water and to the usual impossibility of the transference of the larvae beyond flight distance. Owing to the preference of top-minnows for deeper water they are of doubtful value; nevertheless their presence means a considerable reduction in mosquito larvae. Oiling by drip-can methods proved a failure, but the results obtained with oil-soaked sawdust offer great hopes for ultimate mosquito control in rice-fields.

GEIGER (J. C.), PURDY (W. C.) & TARBETT (R. E.). **Effective Malaria Control in a Rice-field District, with Observations on Experimental Mosquito Flights.**—*Jl. Med. Assoc., Chicago, Ill.*, lxxii, no. 12, 22nd March 1919, pp. 844–847.

In the Lonoke district, Arkansas, malaria has been checked by sterilisation of carriers and anti-mosquito screening. The attempted limitation of mosquito-breeding did not affect the presence of larvae in the rice-fields, *Anopheles quadrimaculatus* being present in large numbers about dwellings, in spite of the fact that all breeding was confined to the fields.

The following observation was made regarding the powers of flight of *A. quadrimaculatus*. Two rice-fields about 1 $\frac{7}{10}$ miles from Lonoke were flooded on 25th May and 15–20 days later *A. quadrimaculatus* appeared in the city. Circumstances pointed to these fields as being the source. To check this observation flight experiments were made, about 4,000 stained individuals being liberated. Only 10 were recaptured. Of these 9 were recaptured at $\frac{3}{4}$ of a mile from the starting point, and 1 at a mile.

DARNALL (W. E.). **New Jersey's Work in Mosquito Control.**—*Jl. Amer. Med. Assoc., Chicago, Ill.*, lxxiii, no. 10, 6th September 1919, pp. 737–742, 7 figs.

This is a brief résumé of the work done in New Jersey in combating mosquitos. The area involved extends over 937 square miles with a population of 2,188,063. The *per capita* cost is about 8*d*.

GRAY (H. F.). **The Cost of Malaria. A Study of Economic Loss sustained by the Anderson-Cottonwood Irrigation District, Shasta County, Calif.**—*Jl. Amer. Med. Assoc., Chicago, Ill.*, lxxii, no. 21, 24th May 1920, pp. 1533–1535.

The economic loss caused in this district in 1918 is due to a number of factors, the three chief ones being medicine, medical service, and labour. Others are due to inability to harvest crops at the proper time owing to malarial attacks, losses on forced sales of property, and losses due to depreciation of property values. At a conservative estimate the last-named would be £50,000.

If anti-malarial measures reduce malaria 50 per cent. in the first year, 75 per cent. in the second, 90 per cent. in the third and 95 per cent in the fourth (as experience in California has shown to be possible), the cost of the three chief items will be saved and the others will show a considerable profit.

OWEN (W. O.). **Illuminated Trap for Night Flying Insects.**—*New York Med. Jl.*, cix, no. 14, 5th April 1919, p. 590, 1 fig.

This trap consists of a fruit jar with a layer of plaster of Paris and potassium cyanide. In the bottom there is a small electric bulb operated by a small battery, the whole being enclosed in a tin container. This trap is said to be of special service in capturing mosquitos.

WILLIAMS (C. L.). **Anti-Malaria Control Measures in Extra-Cantonment Zones.**—*Southern Med. Jl., Birmingham, Ala.*, xii, no. 1, January 1919, pp. 22–28.

This paper describes the work done by the United States Public Health Service in the areas around the different camps. Within the latter the Army authorities were responsible. As the limit of flight of Anophelines is practically one mile, this distance was adopted for the breadth of each zone, beginning at the edge of the camp.

After surveying the ground and preparing estimates, natural channels are cleared, deepened and straightened. In hilly districts seepage ditches with connecting ditches to the main channel must be dug. In large swamp areas it may be necessary to construct an outlet stream and an adequate outlet will rapidly drain and dry the land.

The control of mosquito-breeding in large ponds and lakes is best accomplished by means of fish. This entails a sufficient stock of fish and the clearing of reeds, débris, etc., from the surface and edges. By periodically raising and lowering the water level the banks are kept clean. If the level cannot be varied for economic reasons the banks may be boarded or concreted. Oiling is useful in certain cases. Drainage is a very difficult problem in flat country, particularly in tidal regions. Wide, shallow ditches, where the water may be concentrated and oiled, have given good results. Oiling is used for dealing with the water remaining after drainage operations have been carried out. A mixture of two parts of kerosene and one of heavy black or crude oil is most suitable, but oiling can only be successful if the water is kept free from weeds and débris. Small collections of water may be poisoned by adding nitre cake, a waste product of phosphate fertiliser factories. Another method, apparently highly successful and quite cheap, is the application of commercial creosote in the form of a very fine spray, though if used in excess it will kill all animal life, including large fish.

As constructional anti-malaria work proceeds, maintenance (inspection, cleaning, repairing and oiling) becomes a larger and larger portion of the work. In the 9 zones to which the statistical part of this paper refers, the total number being 36, the territory covered 330 square miles, in which 282 miles of natural channels were cleaned and deepened and 656 miles of new ditches were dug. The expenditure in these 9 zones amounted to about £86,000 and the results are held amply to justify this outlay.

ESCOMEL (E.) **La Trypanosomiase humaine existe dans les Forêts Orientales du Pérou.**—*Bull. Soc. Path. Exot., Paris*, xii, no. 10, 10th December 1919, pp. 723–726.

A case of human trypanosomiasis is recorded from Peru probably for the first time. The patient came from the forest country where the Reduviid, *Triatoma megista*, and other vectors of trypanosomiasis are known to occur. On examining the blood a trypanosome, probably *Trypanosoma* (*Schizotrypanum*) *cruzi*, was found.

REGNAULT (F.). **La Culture des Lentilles d'Eau dans la Lutte contre le Paludisme.**—*Bull. Soc. Path. Exot., Paris,* xii, no. 10, 10th December 1919, pp. 735–736.

Experiments made in Corsica in 1917 show that mosquito larvae were killed by asphyxiation in every case where duckweed [*Lemna*] was propagated. As soon as the duckweed disappeared, the reappearance of mosquito larvae was noticed. The cultivation of this plant should prove a useful remedial measure and cheaper than oiling.

PRATES (M. M.). **La Myiase Oculaire de l'Ile de Sal (Archipel du Cap Vert).**—*Bull. Soc. Path. Exot., Paris,* xii, no. 10, 10th December 1919, pp. 736–740, 1 fig.

The work of previous authors in connection with ocular myiasis in man is reviewed. It is generally caused by *Rhinoestrus purpureus* (*nasalis*) which normally deposits from 8 to 50 larvae in the eyes of equines, and *Oestrus ovis* which, although occasionally oviparous, generally deposits larvae in the nasal cavities of sheep and goats. Both species are recorded as accidentally infesting man. The larvae may occur in man in the throat or nasal fossae, but the eyes are the most common seat of infestation. The patient suffers from acute irritation lasting about a fortnight.

Ocular myiasis due to *Oestrus ovis* is particularly prevalent in the island of Sal. The natives prevent larviposition on the lips by smoking or chewing tobacco. Infestation of the throat can be alleviated by draughts of warm olive oil or by means of a highly spiced diet. Further investigations are to be made to ascertain whether the fly deposits eggs or larvae on the affected organs.

BRUMPT (E.). **Existence de la Spirochétose des Bovidés au Brésil. Transmission de cette Affection par la Tique, *Margaropus australis* (Fuller).**—*Bull. Soc. Path. Exot., Paris,* xii, no. 10, 10th December 1919, pp. 748–757, 1 fig.

Experiments with ticks, *Boophilus* (*Margaropus*) *annulatus australis* Fuller, obtained from Brazil from normal healthy cattle are described. The progeny of these ticks produced a mixed infection of *Piroplasma bigeminum* and *P. argentinum* in a calf. In previous experiments *B. annulatus australis* from Brazil and *B. annulatus calcaratus* from Algiers, Tunisia and Morocco, that had been reared on cattle infected with various anaplasms and piroplasms never transmitted them to susceptible French cattle. During the present observations 9 successive generations of the ticks were reared ; of these some lost their infection with *Piroplasma bigeminum* at the third and with *P. argentinum* at the sixth generation.

From the first to the seventh generation the ticks did not transmit spirochaetosis to any animals upon which they were fed, as far as could be ascertained by simple direct examination. The larvae from female ticks of the 7th generation were fed on a 4-year old Breton cow without producing any abnormal symptoms, but those larvae from adult ticks taken from this cow produced an infection of *Spirochaeta theileri* within 24 hours on a similar animal aged 10 years. Although the author does not admit that spirochaetosis of cattle is entirely absent from France, he is of opinion that the virus was originally obtained from Brazil in the case under observation. This may be accounted for by the hypothesis that the animals on which the ticks were reared, although not presenting any definite symptoms, may yet have had the disease in a latent form. Immunity is very quickly acquired, as is shown by a case in which thousands of infective embryos were placed on a cow 75 days after its first infection, without producing any reaction at all. The author considers that *Spirochaeta equi* and *S. ovina* should be treated as synonyms of *S. theileri*.

BRUMPT (E.). **Transmission de la Piroplasmose canine tunisienne par le** *Rhipicephalus sanguineus*.—*Bull. Soc. Path. Exot., Paris*, xii, no. 10, 10th December 1919, pp. 757–764, 1 fig.

Experiments described in detail show that canine piroplasmosis in Tunis is transmitted by *Rhipicephalus sanguineus*. These observations in common with those previously made in connection with *Dermacentor reticulatus* [*R.A.E.*, B, viii, 41] show that the virus can only be transmitted by adults that are the progeny of females fed in the adult stage on an infected animal.

The life-cycle of *Piroplasma canis* is apparently identical whether transmitted by *R. sanguineus*, *D. reticulatus* or *Haemaphysalis leachi*.

Numerous nymphs of *Ixodes ricinus* and *Haemaphysalis concinna* bred from females fed on infected dogs failed to transmit the disease.

MANDOUL (H.). **Une Mission antipaludique dans la xvii$^{e}$ Région (1917–1918).**—*Bull. Soc. Path. Exot., Paris*, xii, no. 10, 10th December 1919, pp. 779–798.

The topography of the Haute-Garonne and the neighbouring districts is described. During the anti-malarial investigations in 1917–1918 *Anopheles maculipennis* was found to be widely distributed in that region both in the plains and at an elevation of about 3,300 feet. Breeding occurs in any suitable place both in the towns and in the country. The presence of dense duckweed and fish prevents larval development, and watercress beds are apparently not a favourable medium for the multiplication of the larvae.

The range of temperature under which they are able to develop extends from a minimum of 58° F. (14° C.) to a maximum of 85° F. (30·5° C.) The adult Anophelines appear in June and increase in number during July and August more rapidly than Culicines. They disappear by the end of October, whilst Culicines which appear as early as the end of February may still be found in November. Hibernation in this *Anopheles* occurs in the adult stage.

Although indigenous malaria is practically non-existent in the region under discussion, the danger of its spread is imminent in view of the demobilisation of troops. The usual preventive measures, including draining of land, oiling of pools, etc., are advocated.

SCHWETZ (J.). **La Maladie du Sommeil dans le Moyen-Kwilu (District du Kwango, Congo belge) en 1918.**—*Bull. Soc. Path. Exot., Paris*, xii, no. 10, 10th December 1919, pp. 798–812, 1 map.

Investigations were made from October 1918 to January 1919 in the Kwango district of the Belgian Congo, and the locality is described.

Although the streams run through large strips forest and sleeping sickness occurs in all the villages, *Glossina palpalis* and *G. tabaniformis* were exceedingly rare. This was probably due to the fact that the observations were made in October at the end of the dry season, when tsetse-flies are generally less numerous. To the south of the area *G. palpalis* is abundant and was found even in groves or thickets at a distance from water and consisting of very varied vegetation. Many such localities in which *G. palpalis* was found are separated from the nearest water by large expanses of ground devoid of trees, and it is evident that its occurrence in these thickets is chiefly due to the presence of pigs, both tame and wild. Whether the flies breed in these sites has not been ascertained. Other biting flies captured include *Haematopota* sp. Mosquitos were rare.

Sleeping sickness is very prevalent, but is irregularly distributed among villages in close proximity to each other, as well as in different groups of villages. Its incidence was generally higher in villages in the immediate vicinity of large rivers than in those situated on table-lands, but the exceptions were so numerous that a correlation between the occurrence of *G. palpalis* and the numbers of cases could not be established. The number of young children contracting the disease is relatively small, and in most cases the parents were affected at the same time.

The necessity for systematic prophylaxis is emphasised, and it is suggested that a Government medical commission should be sent to carry out the necessary work and direct and co-ordinate the present efforts of missionaries and others.

PLATH (O. E.). **The Prevalence of *Phormia azurea*, Fallen (Larva parasitic on Nestling Birds) in the Puget Sound Region and Data on Two undescribed Flies of similar Habit.**—*Ann. Entom. Soc. America, Columbus, Ohio*, xii, no. 4, December 1919, pp. 373–381. [Received 9th February 1920.]

The larvae of *Phormia azurea*, Fall., have been recorded as habitually sucking the blood of nestling birds, sometimes causing their death, in the San Francisco Bay region. The author records observations in the Puget sound region, where he found the same habit prevalent. From 15th June to 1st August, 54 nests were examined containing ten different species of nestling birds, 33 of them being found infested with larvae of *P. azurea*, Fall., one with a new species of *Phormia* and six with larvae of a new fly of the genus *Hylemyia*. Descriptions of these flies are given, *Phormia metallica*, sp. n., being described by C. H. T. Townsend, and *Hylemyia nidicola*, sp. n., by J. M. Aldrich.

All the nests examined were located in trees and shrubs 3 to 20 feet above ground, with the exception of 8, which were at an altitude of about 40 feet. The nests contained in all 111 nestlings, and although many of the larvae were gorged with blood only two of the nestlings had died ; most of the nest were however those of comparatively large birds. The larvae of *P. metallica* were found in a nest of western robin (*Merula migratoria propinqua*), and when the nestlings took wing, 26 larvae were taken from it. These pupated in a few days ; both larvae and pupae very closely resemble those of *P. azurea*.

The effects of infestation by *Hylemyia nidicola* are very different, and four nests contained only the bones and feathers of nine nearly full-fledged nestlings. From these four nests 283 pupae were taken. None of the nests infested by this species contained any living nestlings when discovered, but judging by the small number of dead birds in most of the nests, it seems possible that some of them may have survived. The larva of *H. nidicola* is much smaller than that of *P. azurea*, and is apparently not a blood-sucker. It is possible that the adults of *H. nidicola* were attracted by odour to nests where the young birds were already dead and laid their eggs or larvae on the decomposing bodies. Another explanation may be that they were deposited while the nestlings were still alive, and caused their death by penetrating into their bodies. In view of the fact that certain species of *Hylemyia* and *Mydaea* are known to attack nestling birds in Central and South America, the second hypothesis is not an improbable one. If it proves to be correct, it will be necessary to take measures against it in order to avoid serious losses among the wild bird fauna.

From further observations of remarkable numbers of a species of bug, probably *Cimex* (*Oecacus*) *hirundinis*, Jen., nearly related to the common bed-bug, *C. lectularius*, and of fleas infesting bird's nests, it is evident that these offer a fruitful field of investigation for the parasitologist.

BUXTON (P. A.). **The Importance of the House-Fly as a Carrier of** *E. histolytica.*—*Brit. Med. Jl., London,* no. 3083, 31st January 1920, pp. 142–144.

Recent observations show that in Lower Mesopotamia the house-fly is a major factor in the carriage of numerous intestinal disorders; over 60 per cent. of the flies caught carried human faeces, over 4 per cent. of them actual human entozoa, and probably at least 0·5 per cent. the cysts of *Entamoeba histolytica.*

NICHOLSON (F. D.). **Tick Fever in Palestine.**—*Brit. Med. Jl., London,* no. 3077, 20th December 1919, p. 811.

Relapsing fever in Palestine is stated to be transmitted by ticks, probably *Argas persicus.* The observations in question were made during the 1917 campaign. The parasite and the course of the disease are described.

**Ticks and Relapsing Fever.**—*Brit. Med. Jl., London,* no. 3082, 24th January 1920, p. 132; no. 3084, 7th February 1920, p. 200; no. 3085, 14th Feburary 1920, p. 235; no. 3086, 21st February 1920, p. 273; no. 3087, 28th February 1920, p. 310.

As a result of the preceding paper, a discussion has arisen in the course of which Dr. J. L. Dunlop records *Argas persicus* as the transmitter of relapsing fever in Persia during the summer of 1918, when the infection apparently varied with the number of bites.

Dr. J. W. Mackenzie records observations that confirm those made by Dr. Nicholson. He considers that the louse-borne and tick-borne diseases are clinically of two different types.

According to Dr. R. E. Drake-Brockman the transmitting agent in Somaliland is *Ornithodorus savignyi*, and although *Argas persicus* is abundant, there is no proof of its being capable of becoming the vector.

Dr. H. M. Woodcock has found a distinct difference in the number of spirochaetes in the louse-borne and tick-borne cases of relapsing fever and he considers it quite possible that *Argas* may be the transmitting agent. According to Dr. A. Balfour, although this is not impossible, further proof is required before the hypothesis can be accepted as a fact.

Byam (W.) & Lloyd (L.). **Trench Fever: Its Epidemiology and Endemiology.**—*Proc. R. Soc. Med., London*, xiii, 1919, pp. 1–20, 8 charts, 2 tables, 1 fig. [Received 3rd Febuary 1920.]

The bulk of the information here given has been noticed elsewhere [*R.A.E.*, B, vi, 225; viii, 10]. Recent investigations confirm previous statements [*loc. cit.*], but it has been found that the blood of patients may remain infective and be capable of infecting lice fed on it as late as the 443rd day of the disease.

Evans (W.). **Anti-Malarial Work with the Australian Mounted Division in Palestine.**—*Med. Jl. Australia, Sydney*, 6th year, ii, no. 25, 20th December 1919, pp. 526–529, 1 map.

The anti-malarial work carried out by the Australian forces in the vicinity of the river Aujah, including the usual treatment of breeding areas and prophylactic measures, are described. Although all possible precautions were taken nearly 2 per cent. of the men contracted malaria, but the majority of these were probably infected by mosquitos deriving their origin in enemy country.

With the return of these malaria carriers to Australia the necessity of early investigations and treatment of both primary and secondary cases is emphasised. Should many fresh cases occur, complete eradication of the anopheline breeding areas will have to be undertaken.

de Meza (J.). **Veterinary Division.**—*Ann. Rept. Nyasaland Dept. Agric. Year ended 31st March 1919, Zomba*, 29th November 1919, pp. 7–8.

Only isolated cases of demodectic mange have been met with in the Zomba and Blantyre districts, but in Southern and Northern Rhodesia the disease is still giving great trouble. With the co-operation of planters and systematic dipping against ticks it is hoped that piroplasmosis in cattle will entirely disappear. Investigations are being made in connection with a new disease of calves and sheep of which the causal organism resembles a piroplasm.

Isolated outbreaks of trypanosomiasis have been reported from all parts of the Shire Highlands. In the Mlanje district the disease is spreading and it is feared that *Glossina brevipalpis* is more widely distributed than was previously thought to be the case.

Bishopp (F. C.). **The Fowl Tick and how Premises may be freed from it.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1070, December 1919, 16 pp., 9 figs.

The bulk of the information given in this bulletin on *Argas persicus* (*miniatus*) has been noticed elsewhere [*R.A.E.*, B, i, 115].

Ferris (G. F.). **Contributions toward a Monograph of the Sucking Lice. Part I.**—*Leland Stanford Junior Univ. Publications, Cal.*, 1919, 51 pp., 32 figs.

This is the first part of a series of papers, which it is hoped will constitute when complete a monograph of the Anoplura.

Of the genus *Enderleinellus* thirteen new species are described, and a new genus *Microphthirus* is erected for *M. uncinatus*, Ferris.

Horst (M. D.) & de Raadt (O. L. E.). **De juiste Namen voor de Javaansche groote Huisrat en de Sawahrat.** [The correct Names for the big Java House-rat and for the Field-rat.]—*Tijdschr. Vergelijk. Geneesk., Leyden*, iii, 1918, pp. 253–255, 1 plate. [Received 7th February 1920.]

This note is of interest in view of the relation of rats to fleas and the spread of plague due to their association. As the result of examinations made at the Leyden Natural History Museum the large Java house-rat, formerly known as *Mus grisciventer*, Bonhote, is here stated to be *Mus diardii*, Jentink. The latter name has hitherto been used for the field-rat [in the Dutch East Indies], and this must now be re-named *Mus rattus brevicaudatus*, subsp. n.

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de Raadt (O. L. E.). **Tabel voor Determineering van Indische Ratten. Tabel voor Determineering van Vlooien** [Fleas]. **Tabel voor Determinatie van Anophelinen in Nederlandsch-Oost-Indië.**—*Tijdschr. Vergelijk. Geneesk., Leyden*, iv, 1919, pp. 82–95, 8 figs. [Received 7th February 1920.]

The first of these tables describes the distinguishing features of the rats found in British India and the Dutch East Indies. The second deals with fleas in general. The third table, of which W. H. van Seters is a joint-author, covers the Anopheline mosquitos of the Dutch East Indies.

Stein (P.). **Einige Anthomyiden von der Insel Simalur bei Sumatra.** [Some Anthomyids from the Island of Simalur near Sumatra.]—*Tidschr. Entomologie, The Hague*, lxii (1919), Supplmt., January 1920, pp. 40–46.

**Anthomyiden aus Java, Sumatra, Waigeoe und Ceram.**—*Ibidem*, pp. 47–86.

Among the flies dealt with in the first of these papers are *Stomoxys calcitrans*, *Lyperosia* sp., and *Musca domestica*, four other species being described as new.

From the islands mentioned in the title of the second paper the species recorded include *Stomoxys brunnipes*, Grünb., *S. calcitrans*, *Philaematomyia crassirostris*, Stein, and 22 new ones. A key is given to the male characters of *Ophyra chalcogaster*, Wied., *O. spinigera*, Stein, *O. simplex*, Stein, and *O. hirtitibia*, sp. n.

Fry (A. S.). **An Epidemic of Fifty-four Cases of Relapsing Fever observed in Birjand, East Persia.**—*Indian Med. Gaz., Calcutta,* lv, no. 1, January 1920, pp. 2–8, 1 plate, 19 charts.

The symptomatology and treatment of relapsing fever during an epidemic which occurred in January 1919 in East Persia is described. The disease was chiefly disseminated by lice and in a few instances by bed-bugs. A louse taken from a patient and crushed showed the presence of spirochaetes when stained, but the degree of louse-infestation apparently bore no relation to the severity of the disease.

Ellenberger (W. P.) & Chapin (R. M.). **Cattle-Fever Ticks and Methods of Eradication.**—*U.S. Dept. Agric., Washington, D.C.,* Farmers' Bull. 1057, October 1919, 32 pp., 5 figs., 4 tables. [Received 10th February 1920.]

The bulk of the information contained in this bulletin has been noticed elsewhere [*R.A.E.*, B, vi, 143, etc.].

The properties of substances used in making dips are discussed; these include white arsenic, caustic soda, lye, sodium carbonate and pine-tar. The dips advocated include the S.-B., or "self-boiled" dip, consisting of arsenic stock and tar stock. To make the former, 4 lb. of caustic soda is dissolved in 1 U.S. gal. of water, to which 10 lb. of white arsenic should be added in portions of 1 to 2 lb. at a time. The liquid should be continually stirred unless it begins to boil, in which case it must be allowed to cool before continuing the addition of arsenic. Should the liquid remain muddy or milky, another gallon of water should be added, and if it still does not clear, it must be placed on the fire and heated nearly but not quite to boiling point so as to dissolve the arsenic; after this the mixture should be diluted to about 4 U.S. gals. and 10 lb. of washing-soda crystals should be added and stirred until dissolved. When cold, the solution should be made up to 5 U.S. gals. with water and allowed to settle. This arsenic stock may be kept in jugs or demijohns if well corked, but it must not be mixed with the tar stock except in the diluted dipping bath.

The tar stock consists of ¾ lb. of caustic soda dissolved in 1 U.S. qt. of water to which 1 U.S. gal. of pine-tar is added, the whole being well stirred. This mixture may be tested by dropping about a teaspoonful of it into a glass of water. Should globules of tar be visible more caustic soda in solution must be added to the mixture, which when ready may be stocked in closed containers.

Another dip known as the "boiled" dip consists of 24 lb. of washing-soda crystals, 8 lb. white arsenic, 1 U.S. gal. of pine-tar and 25 U.S. gals. of water.

This may be diluted to a 500 U.S. gal. bath, whereas 1 U.S. gal. of S.-B. dip will make 125 U.S. gals. of bath. The method of replenishing the bath and correcting its strength, as well as the precautions necessary in the use of arsenic and arsenical dips, are discussed at length.

Hutchison (R. H.). U.S. Bur. Entom. **Experiments with Steam Disinfectors in destroying Lice in Clothing.**—*Jl. Parasitology, Urbana, Ill.,* vi, no. 2, December 1919, pp. 65–78.

Experiments have been made to ascertain the minimum requirements as regards pressure, time and temperature for louse destruction only. These observations carried out on *Pediculus humanus* are described. The results show that if 15 pounds pressure is produced in the disinfector within 5 minutes and kept up for another 10 minutes with a 10 inch preliminary vacuum and a 10 inch drying vacuum a temperature of 167° F. (75° C.) is obtained, which is sufficient to kill the lice. Individual bundles of garments in the disinfector itself must not be packed too tightly.

MOORE (W.) & HIRSCHFELDER (A. D.). **An Investigation of the Louse Problem.**—*Research Publications Univ. Minnesota, Minneapolis,* viii, no. 4, July 1919, 86 pp., 2 figs., 6 charts. [Received 4th February 1920.]

This paper deals with methods of rearing lice, the pathological effects of the bite of the clothes-louse (*Pediculus humanus*), and its destruction.

It is summarised by the author as follows: Lice may be reared under incubator conditions in large numbers, if fed with human blood twice daily, but under such conditions the life-cycle is slowed down, and the daily and total egg-production per female is reduced. Fever, rash, and a general lassitude are produced as a result of the louse bites. Lice and their eggs are destroyed by the ordinary laundering processes used in the washing of cotton and khaki goods; for woollens slight alterations in the methods of washing are necessary. Chloropicrin may be used for fumigation of garments, accomplishing the desired results in a short period of time with a small quantity of the chemical, without the use of high temperatures. The sachet method of controlling lice is ineffective or very expensive. Louse powders may be used with success but, being a wasteful method of applying an insecticide, are not recommended. Impregnation of the underwear is the most promising method of louse control between lousings. Active chemicals of very low volatility are necessary to prove effective for the longest period of time. Halogenated phenols, such as dibrommetacresol, dichlormonobrommetacresol, and their sodium salts, dibromcarvacrol and dibromxylenol, were found to be the most promising under laboratory conditions.

TRYON (H.). **Report of the Entomologist and Vegetable Pathologist.**—*Ann. Rept. Queensland Dept. Agric. & Stock for the Year 1916–1917, Brisbane,* 1917, pp. 49–63. [Received 11th February 1920.]

The parasites recorded include: The dog tick, *Rhipicephalus sanguineus,* which is reported from the Northern Territory; *Ixodes holocyclus,* Neum., which occurs on many animal hosts including man; *Haemaphysalis papuana,* Thorell; the bot-fly, *Gastrophilus nasalis,* which is apparently spreading and is found in certain districts on the wing as early as 1st October; *Hippobosca equina*; *Ortholfersia macleayi,* which was found on a marsupial and on a horse.

Special investigations have been carried on in connection with sheep-maggot flies, the species dealt with including *Anastellorhina augur* (mottled blow-fly), *Pollenia stygia* (*villosa*) (large yellow blow-fly), *Neocalliphora ochracea* (large red blow-fly), *Calliphora incisoralis* (dark blue blow-fly), *Chrysomyia* (*Pycnosoma*) *rufifacies* (golden-green blow-fly), *C.* (*P.*) *varipes* (small green blow-fly), *Lucilia sericata*

(English sheep-fly), *Sarcophaga aurifrons* (grey striped flesh-fly), *S. frontalis* (large striped flesh-fly), *Synthesiomyia brasiliana* (red-tailed fly) and *Ophyra analis* (shining black fly). Other parasites include: *Oestrus ovis* (nasal fly), which is apparently spreading; a louse, *Haematopinus suis*; *Tracheomyia macropi* (marsupial bot-fly); and the ticks, *Argas persicus* and *Aponomma* sp.

Tryon (H.). **Report of the Entomologist and Vegetable Pathologist.** —*Ann. Rept. Queensland Dept. Agric. & Stock for the Year 1918–1919, Brisbane,* 1919, pp. 37–49. [Received 11th February 1920.]

The parasites recorded include: *Boophilus annulatus australis* attacking cattle and horses; *Haemaphysalis papuana,* Thor., infesting cattle; *Gastrophilus nasalis* in horses; *Oestrus ovis* in sheep; *Rhipicephalus sanguineus* (dog tick) which is gradually spreading and is an intermediate host of *Piroplasma* (*Babesia*) *canis,* causing malignant jaundice; and an Acarid, *Dermanyssus* sp.

It is suggested that an attempt should be made to introduce the egrets, *Herodias garzetta* and *H. ralloides,* into Queensland from South Africa, as they are known to feed on cattle ticks.

Edwards (C. W.). **Effect of Cattle Ticks on imported and locally grown Ayrshire Cattle.**—*Rept. Guam Agric. Expt. Sta.,* 1918; *Washington,* D.C., 14th October 1919, p. 12. [Received 15th February 1920.]

*Piroplasma bigeminum,* the causal organism of Texas fever, has never been definitely identified in the blood of native cattle in Guam, but introduced Ayrshire cattle exhibit symptoms similar to Texas fever whenever they became tick infested. *Boophilus* (*Margaropus*) *annulatus australis* and *B. annulatus* are both recorded from the island. Of the original imported stock two individuals died of the disease and the remaining two after several years have apparently acquired complete immunity. With one possible exception the locally-bred pure-blooded progeny of the imported cattle have been entirely immune to the disease.

Lichtwardt (B.). **Dipteren aus Lappland.** [Diptera from Lapland.] —*Entom. Mitt., Berlin,* iii, no. 9, 15th September 1914, pp. 276–279. [Received 12th February 1920.]

Among the Diptera mentioned in this paper are *Tabanus tarandinus,* L., *T. lapponicus,* Wahlberg, *T. borealis,* F., *T. luridus,* Fall., *Chrysops nigripes,* Ztt., *Oedemagena tarandi,* L., *Cephenomyia trompe,* L., *Phormia caerulea,* R.-D., and *P. azurea,* Fall. (*Calliphora groenlandica,* Ztt.).

Eysell (A.). *Sarcophaga fuscicauda,* **Boettcher, ein Darmparasit des Menschen (Dipt.).** [*S. fuscicauda,* an Intestinal Parasite of Man.]—*Entom. Mitt., Berlin,* iv, no. 1–3, 8th March 1915, pp. 4–8, 4 figs. [Received 12th February 1920.]

Details are given of the adult, larva and pupa of *Sarcophaga fuscicauda,* Boettcher. The adult flies were bred from larvae obtained from a Chinese sailor who suffered severely from intestinal catarrh until treatment with santonin and calomel caused their expulsion.

Russell (W. A.) & Brown (W. G.). **Combating the Blow-Fly. New Treatment recommended.**—*Science & Industry, Melbourne,* 1, no. 8, December 1919, pp. 487–489, 1 fig.

Observations show that jetting sheep with a dip containing about 0·2 per cent. of arsenious oxide in solution is a far more effective and cheaper method of preventing blow-fly attack than the older one of crutching. The method of applying the jet is described.

Manson-Bahr (P.). **Bacillary Dysentery.**—*Trans. Soc. Trop. Med. Hyg., London,* xiii, no. 5, 16th January 1920, pp. 64–72.

The etiology, pathology, symptoms, diagnosis and treatment of bacillary dysentery are discussed. With regard to the epidemiology there apparently exists a definite relation between it and the appearance of the house-fly, *Musca domestica.* In places such as Egypt the bacillus has been found in the intestinal tract of flies caught in the desert about two miles from the nearest camp and at a great distance from any human faecal deposits. These observations were made in October. Laboratory experiments show that the bacillus may live about four days in the intestinal tract of the fly, whereas if exposed to the sun in the desert it will only survive a few hours. In view of this fact the fly must have the opportunity of feeding on blood and mucus stools directly they are passed to be able to ingest a sufficient number of bacilli to spread an epidemic in the community; this, however, is impossible where good sanitary conditions prevail.

Clarke (J. T.). **The Etiology of Rheumatic Fever from a Tropical Point of View. A Flea the Probable Carrier.**—*Trans. Soc. Trop. Med. Hyg., London,* xiii, no. 5, 16th January 1920, pp. 83–89, 2 charts.

As there is a strong correlation both in time and place between the occurrence of rheumatic fever and fleas, it is suggested that these insects may prove to be the carriers of the disease.

The real host of the organism is probably the rat and the most likely species of fleas to disseminate the disease are *Pulex irritans* and *Ceratophyllus fasciatus.*

There is a similar relation between fleas and scarlet fever.

Wood (H. P.). **Tropical Fowl Mite in the United States, with Notes on Life History and Control.**—*U.S. Dept. Agric., Washington, D.C.,* Dept. Circ. 79, January 1920, 8 pp., 2 figs.

The tropical fowl mite, *Liponyssus bursa,* is recorded from Raymond, Illinois, where it was discovered in May 1919. The eggs may be laid on the host or in the nest and hatch in about 3 days. The larvae do not feed until after the first moult, which takes place about 17 hours after emergence. The second moult occurs in from 1 to 2 days, but the subsequent ones have not been observed. Poultry and English sparrows are apparently the chief hosts.

The most effective remedial measures are a dip consisting of 2 oz. of sulphur, 1 oz. of soap and 1 U.S. gal. of water, or dusting with sulphur or pyrethrum and dipping in a solution of 1 teaspoonful of 40 per cent. nicotine sulphate to 1 U.S. gal. of water and about ½ oz. of soap. These measures were followed by a general cleansing of the poultry houses, etc., and finally the fowls were thoroughly dusted with sulphur and exposed to rain. No bad results were noted. This treatment combined with a continuous war against sparrows will it is hoped eradicate the present infestation.

PARKER (T.). **The Rat Problem.**—*Vet. Jl., London,* lxxvi, no. 2, February 1920, pp. 50–62.

The damage caused by rats, as well as measures for dealing with them including the use of baits, poisons, traps and gases, are discussed.

Diseases carried by rats include spirochaetal jaundice, rat-bite fever, plague and tuberculosis. The transmitting agents of some of these diseases to man are the fleas, *Ceratophyllus fasciatus* and *Pulex irritans.*

The dog and cat fleas, *Ctenocephalus canis* and *C. felis,* are also frequently found on rats.

BERTRAND (G.) & BROCQ-ROUSSEU. **Sur la Dératisation par la Chloropicrine.**—*C. R. Hebdom. Acad. Sci., Paris,* clxx, no. 6, 9th February 1920, pp. 345–347.

The results of experiments made to test the action of chloropicrin on *Mus decumanus* and on the flea infesting it, *Ceratophyllus fasciatus,* Bosc., are given in tabular form. The vapour of this substance may be considered a very effective agent for destroying both rat and fleas and as it has no effect on material or colours, it may be usefully employed for dealing with rat-infested ships.

The rats examined were found to carry the largest number of fleas in August and very few during autumn and winter.

GÉRARD (P.). **Note sur la Distribution géographique du Genre *Glossina* dans la Région minière de la Lukuga supérieure.**—*Rev. Zool. Africaine, Brussels,* vii, no. 3, 15th November 1919–15th January 1920, pp. 229–235, 1 map.

This article deals with the distribution in Upper Lukuga, Belgian Congo, of *Glossina palpalis, G. morsitans, G. pallidipes, G. brevipalpis* and *G. fuscipleuris,* and includes a map of the district illustrating the author's journeys and the places at which the various species were found.

BROLEMANN (H. W.). **Sur quelques *Culex* des Pyrénées, ii : Campagne 1918.**—*Ann. Soc. Entom. France, Paris,* lxxxviii, no. 1–2, 1919, pp. 65–103, 40 figs.

Notes with details of the structure of the genitalia are given on twelve species of mosquitos collected in the Pyrenees, with descriptions and figures of *Ochlerotatus geniculatus* (*Culicada albopunctata*), *O. rusticus* (*C. quadratimaculata*), which however does not occur in the Pyrenees, *C. cantans,* O.* (*C.*) *nemorosus salinus,* O. caspius* (*C. penicillaris*), *Theobaldia annulata, T. morsitans,* T. longiareolata* (*spathipalpis*) [see also *R.A.E.*, B, vii, 140]. A new sub-genus, *Allotheobaldia,* is erected for the last-named.

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[* We are informed by Mr. F. W. Edwards that these species have been incorrectly identified. The correct names should be *Ochlerotatus annulipes,* Mg., *O. dorsovittatus,* Villen., and *Theobaldia fumipennis,* Steph., respectively.—ED.]

Barbieri (A.). **Campaña antipalúdica.** [Anti-malaria Campaign.] *Anales Dep. Nac. Higiene, Buenos Aires,* xxv, no. 4, July & August 1919, pp. 54–57.

Statistics are given of the malaria cases attended to and the quinine distributed in the northern Argentine provinces during the first six months of 1919 under the anti-malarial laws. The staff of the anti-malaria campaign also collaborated in the measures taken to subdue plague and typhus in the same provinces. In attempting to control malaria, attention is drawn to the difficulties, in spite of extensive funds, arising from the magnitude and topography of the regions dealt with, the economic poverty of the provinces, the social habits of the population, etc. In any case endemic malaria can only be controlled by systematic and continuous efforts over a long period.

Schiemann (O.). **Ueber schwefelige Säure als Mittel zur Tötung von Läusen und Flöhen.** [Sulphurous Acid for killing Lice and Fleas.]—*Zeitschr. Hyg. u. Infektionskr., Leipzic,* lxxviii, no. 3, 17th December 1918, pp. 389–409.

Fleas are very susceptible to sulphur dioxide, their larvae and lice are somewhat less so, and the eggs of lice are still more resistant.

In a room of 40 cu. metres capacity (1,400 cu. ft.) at a temperature of 12°-20° C. (52°-68° F.) and containing a batch of clothing (weighing about 154 lb.) but otherwise empty, and with gas taken from a cylinder of liquid $SO_2$, lice and their eggs were killed in 4 hours when $SO_2$ was present at a strength of 2½ per cent.; 4 per cent. proved fatal in 1½–2 hours, even when the articles were packed in a laundry basket and well covered. The operator runs less risk of infestation if the garments have not to be spread out.

Under similar conditions, but using burning sulphur, a strength of 2½ per cent. $SO_2$ proved insufficient in 4 hours. Using burning salforkose (90 per cent. $CS_2$, carbon bisulphide), 3 per cent. of $SO_2$ also proved ineffective and higher strengths are necessary. An equal strength of gas from cylinders is therefore more effective; whether this is due to impurities in the product from burning sulphur or $CS_2$ is not known. The opposite result is obtained in the case of bacteria. Rooms at low temperatures such as 12°–14° C. (52°–57°F.) must be warmed before fumigation.

In cupboards almost filled with garments 44 per cent. $SO_2$ will destroy fleas and lice in one hour, but for such a strength the gas must be obtained from cylinders.

Sergent (Ed.) & Lhéritier (A.). **Fosse à Fumier sans Mouches.**—*Rev. d'Hyg. et de Police Sanitaire,* September-October 1918, p. 553. (Abstract in *Bull. Office Internat. Hyg. Publique, Paris,* xi, no. 4, April 1919, pp. 430–431.)

This is an illustrated description of a manure pit at the Pasteur Institute in Algiers. Built in 1912, it comprises twin pits of ferro-concrete. These are raised on pillars so that a cart may be placed beneath them for subsequent removal of the manure. This is thrown into one of them twice a day by means of a trapdoor in the top. Fermentation results in a high temperature—201° F. (94° C.) in the centre. After a fortnight one container is full and the other is then utilised. About 10 days after beginning to fill the second container the first is emptied. The liquid that collects at the bottom of the containers is led away through a pipe to a sealed pit. Owing to the great heat developed within the containers the eggs and larvae of flies are not found except sometimes on the inner surface of the metal covers of the doors.

Ludlow (C. S.). **One Phase of the Mosquito Work connected with Army Camps in 1918.**—*Milit. Surgeon, Washington, D.C.*, xlv, no. 3, September 1919, pp. 313–318.

The study of mosquitos by the U.S. Army medical authorities was carried on as far back as 1901. In 1918 collections of mosquitos were received from 57 stations with the following results.

*Anopheles punctipennis*, *A. quadrimaculatus* and *A. walkeri* were recorded from Michigan; *A. punctipennis* from Washington; *A. quadrimaculatus*, *A. barberi* and *A. atropos* from the Atlantic coast States. *A. pseudopunctipennis* is confined to a comparatively small region in the south-west, apparently not east of Texas nor north of San Francisco, but it extends southwards and is taken in large numbers in Panama. *A. crucians* occurs from the general vicinity of Washington, D.C., down the Atlantic coast States, in the Gulf States as far as Louisiana and up the Mississippi as far as Arkansas. The localities suggest some peculiar choice of breeding-places, not yet sufficiently worked out, though Dr. Metz has given very interesting points [*R.A.E.*, B, vii, 47, 88].

Specimens of *Stegomyia fasciata* were received from Chattanooga, Austin, San Antonio, Montgomery, Carlstrom Field, Florida, and Camp J. E. Johnston, Florida.

The routine methods at the Army Medical Museum are the examination and determination of specimens and the recording of each lot under its proper post. The records cover all points available, and a report of the findings of the collection is then sent to the camp surgeon and a memorandum prepared showing the posts, dates, and in what number disease-bearing mosquitos were taken.

Chiriboga (J. M.). **Primera Descripción del Tifus recurrente en el Perú, particularmente observado en el Departamento de Huancavelica.**—*Crónica Méd., Lima*, xxxvi, no. 670, April 1919, pp. 127–131.

This is the first record of recurrent fever in Peru. The disease occurred in the department of Huancavelica, where poverty, lack of hygiene, scarcity of food, and abundance of lice, were the prevalent conditions.

Noguchi (Hideyo). **Etiology of Yellow Fever. ix. Mosquitoes in Relation to Yellow Fever.**—*Jl. Experimt. Med., Baltimore, Md.*, xxx, no. 4, 1st October 1919, pp. 401–410.

The investigations described in this paper, which is one of a series on the aetiology of yellow fever, showed that the organism isolated from yellow fever cases (*Leptospira icteroides*) also conformed, under certain conditions, to the known characteristics of the yellow fever virus in relation to mosquito transmission.

Symptoms and lesions closely resembling those of yellow fever in man may be induced in guinea-pigs by the bite of female examples of *Stegomyia* that have previously sucked the blood of a yellow fever patient or an animal experimentally inoculated with *L. icteroides.* The optimum temperature at which this organism remains viable for many months is 26° C. (78° F.), so that most tropical countries offer suitable conditions both for it and for the mosquito that carries it.

Ford (T. A.). **Notes on Veterinary Practice in the West Indies and the Malay States.**—*Vet. Jl., London,* lxxv, no. 8, August 1919, pp. 45–54. (Abstract in *Trop. Vet. Bull., London,* vii, no. 4, 30th December 1919, pp. 267–271.)

In Antigua the numerous ticks found infesting cattle are of two kinds, a small species of *Ixodes* and *Amblyomma variegatum* (St. Kitts or " gold " tick).

Bevan (Ll. E. W.). **Inoculation of Cattle against Redwater and Gall-Sickness.**—*Rhodesia Dept. Agric., Salisbury,* Bull. 316, April 1919, 10 pp.

It is estimated that in Southern Rhodesia the losses due to the diseases caused by infestation with blue ticks [*Boophilus annulatus decoloratus*] exceed £500,000 a year. The total eradication of the ticks by systematic and universal short-interval dipping will probably eventually eliminate these losses.

Hayashi (N.), Muskoyama (—) & Oshima (—). **Tsutsugamushi Disease : Results of Investigation in 1918.**—*Japan Med. World, Tokyo,* 29th June 1919. (Abstract in *Jl. Amer. Med. Assoc., Chicago, Ill.,* lxiii, no. 6, 9th August 1919, p. 454.)

From one area infected with Japanese river fever as many as possible of the mites suspected as vectors were collected ; three different forms of them were found, but only one was able to transmit the infection. These mites infest field voles, domestic fowls and a bird, *Acrocephalus orientalis,* which must be responsible for the spread of infection over a wide area. Preventive measures include the extermination of these hosts, the use of overalls in field work, soil disinfection and the application of insecticides to the exposed parts of the body.

Swellengrebel (N. H.). **Méthode de Recherche de rares Parasites du Paludisme dans le Sang périphérique.**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 1, 14th January 1920, pp. 20–22.

In the course of investigations on the transmission of malaria by Anophelines in Malaya, it has been found that the method of culture *in vivo* can be employed to reveal the presence of malarial parasites when existing in small numbers in the peripheral blood. A Javanese coolie, the carrier of numerous crescents, was bitten by many individuals of *Anopheles* (*Myzomyia*) *ludlowi*, all of which became infected, and two of them subsequently transmitted malignant tertian malaria (*Plasmodium praecox*) to two previously healthy persons. Of 15 individuals of *A. hyrcanus* (*M. sinensis*) and 68 of *A.* (*M.*) *umbrosus*, two of each species also became infected, although both species generally prove immune to *P. praecox* (*falciparum*). The pigment of the young oocysts in *A. hyrcanus* and *A. umbrosus* was found to be fine and of a yellowish brown colour, contrasting with the thick, black pigment of the oocysts of malignant tertian malaria found in *A. ludlowi*, and accompanied by less numerous oocysts with fine pigment. The fine, yellowish-brown pigment seems to be characteristic of the oocysts of *P. vivax*, especially when young. The coolie in question therefore undoubtedly suffered from a mixed infection of malignant and benign tertian, the latter being revealed only after several days' repeated microscopic examination of the peripheral blood. From another coolie, suffering apparently from a pure infection of *P. praecox*, a mixed infection of *P. praecox* and *P. vivax* has been recovered from the Anopheline vectors, and the latter parasite has also been transmitted to a healthy individual who contracted benign tertian malaria.

It is therefore sufficient to induce biting by a mosquito the stomach of which is examined after four days or more; if oocysts are discovered, the nature of the pigment is sufficient to determine the species of parasite. The parasite of quartan malaria is the only one that presents difficulties in determination, the pigment being intermediate in character between that of *P. vivax* and *P. praecox*.

The explanation of *A. ludlowi* not transmitting benign tertian in the first case recorded lies in the fact that in the blood ingested *P. vivax* was very scarce and crescents were very numerous, with the result that the oocysts of *P. vivax* were overwhelmed by those of *P. praecox* and remained in an immature state. In the case of *P. praecox* in the stomach of *A. hyrcanus* the surrounding medium was evidently not favourable to development, and therefore the few gametes of *P. vivax* ingested at the same time were able to develop.

M. Brumpt in commenting upon this paper remarks that he has made use of the method for many years in his studies of trypanosomes. M. Roubaud considers that the practice, while interesting, cannot be relied upon for absolute accuracy, chiefly because Anophelines do not always become infected from gamete carriers, and the same uncertainty is still more marked in the case of the development of pathogenic trypanosomes in *Glossina*.

DELANOË (P.). **Un Cas d'Infection spontanée du Chien par *T. marocanum*, Sergent, Lhéritier et Belleval, 1915.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 1, 14th January 1920, pp. 23–26.

The case is recorded of a dog observed in Morocco, in August 1919, to be suffering from trypanosomiasis caused by *Trypanosoma marocanum*.

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MUSSO (L.). **Traitement de la Gale du Dromadaire par le Goudron de Coloquinte. (Deuxième Note.)**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 1, 14th January 1920, pp. 29–34.

Mange in camels cannot be treated by any method involving wetting of the animals owing to their extreme susceptibility to chill after such a process. A study has therefore been made at the Pasteur Institute of the traditional method practised by the nomad tribes of northern Africa, which consists of the application of a wood-tar made by the distillation of *Juniperus phoenicea* and *Thuya articulata.* Another preparation used by natives consists of an ointment made from ground colocynth. A sample of the latter has been obtained, and the result of its analysis is given in detail with full instructions for its preparation from ripe, dry colocynth fruits. This ointment is said to be particularly effective in cases of mange in camels, one application frequently being successful, and two generally curing even the worst cases. The quantity of ointment produced in the laboratory has been too small as yet for extensive tests, but it is hoped to experiment with a slightly different composition when larger quantities are obtained.

JOUVEAU-DUBREUIL ( ). **Etude clinique sur la Fièvre récurrente du Setchouen (Chine occidentale).**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 1, 14th January 1920, pp. 38–62.

Recurrent fever exists in an endemic form in western China, and recurs every year with much the same characteristics, the same seasonal variations and to about the same extent. Each spring it assumes an epidemic form, but never completely dies out. By far the greater number of persons attacked belong to the very poor and frequently to the beggar class, who live in very dirty and insanitary conditions; no case has been observed among the wealthy Chinese. Since it is known that lice are the vectors of recurrent fever, it is obvious that the seasonal occurrence of the disease coincides with that of the insects. After the epidemic of the spring, clothing becomes lighter during the summer and conditions are altogether more hygienic and overcrowding less frequent, with the result that lice decrease considerably in numbers and there is much less fever. After the first cold spells, dirty clothing is resumed, vermin reappears and multiplies, reaching its maximum numbers in early spring, and is followed by a recrudescence of fever. An account is given of the course of the fever and its effects. The extermination of lice, which is the only means of combating the fever, is practically impossible and will be so for many years, so long as the present poverty and misery continue. In the army, conditions are somewhat improved and fever cases are isolated from healthy individuals, but among the poor, where isolation is impossible and proper clothing unobtainable, hygienic measures may be advocated, but cannot be enforced.

PÉJU (G.). **Foyers d'Anophèles dans les Ardennes.**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 1, 14th January 1920, pp. 75–92.

A full account is given of a mosquito survey of the Ardennes [*R.A.E.*, B, viii, 39]. Among the species found are *Culex pipiens,*

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which forms a large percentage of the mosquito fauna, *Ochlerotatus geniculatus* (*C. albopunctatus*), *Anopheles maculipennis*, *A. bifurcatus*, *Theobaldia annulata* and *Aëdes cinereus*.

The author has never been able to discover any locally-acquired cases of malaria, and has examined numbers of children for the characteristic enlarged spleen, without success. The presence of great numbers of Anophelines over large areas explains the outbreaks of malaria at various points in the trenches of this region during the War. These centres of infection have usually been in the neighbourhood of rivers or marshes. Both *Culex* and *Anopheles* are disseminated around these centres by concentric air currents, by which their zone of activity is limited. Malaria is however of such infrequent occurrence in the Ardennes that the destruction of hibernating adults, which would be the effectual method of prophylaxis, is not considered necessary, but as a safeguard, the removal of malaria cases from the centres of infection is advocated.

STUB (C.). **Hypodermalarvers Intrangen gennem Oksens Hud.** [The Penetration of the *Hypoderma* Larva through the Skin of the Ox.]—*Maanedsskrift for Dyrlaeger, Copenhagen*, xxxi, 1919–20, pp. 230–31.

On a calf brought to the cattle market of Copenhagen the author found in the flayed carcase a limited but distinct yellowish jelly infiltration in the superficial connective tissue on the inner side of the right fore-leg without any extravasation of blood. From this point he was able to trace a connection over the shoulder to the connective tissue around the cervical muscles and thence to the tissue between the trachea and oesophagus, where a number of small *Hypoderma* larvae (1–2 mm. long) were found. Larvae were also found along the route described and this observation shows how it is that *Hypoderma* larvae often occur in the tissue around the gullet, though they generally enter the skin of the forelimbs.

BRODERSEN (L.). **Om Rosenfeber hos Kvoeg.** [On "Rose Fever" of Cattle.]—*Maanedsskrift for Dyrlaeger, Copenhagen*, xxxi, 1919–20, pp. 321–23.

The so-called "rose fever" of cattle is an acute but usually a transient and not fatal disease that generally attacks animals on pastures in spring or early summer. It causes extensive oedema, especially on the eyelids, muzzle and lower jaw and often also on the udder and the region of the anus, etc. The cause of it has hitherto not been understood, and it has often been attributed to mistakes in feeding. The author however advances much evidence to show that it has some connection with the expressing of the larvae of *Hypoderma* from the warbles, a process which is systematically carried out in the dairy districts of Denmark. The onset of the disease begins on the same day as this operation, often within 1 or 2 hours, and it is thought that when a *Hypoderma* larva is crushed in the process the exuding lymph has a toxic effect on the animal. Attacks of rose fever have however been observed in cattle where no expressing of the larvae has been done and these cases are considered to be due to the death of a larva in the body of the host.

JENSEN (C. O.). **Bermorkninger om Hypodermalarvernes Forhold til Rosenfeber.** [Remarks on the Connection between *Hypoderma* Larvae and "Rose Fever."]—*Maanedsskrift for Dyrlaeger, Copenhagen*, xxxi, 1919–20, pp. 324–25.

In view of the paper noticed above, the author gives some details of experiments made by him 16 years ago. In slaughter-houses the presence of larvae of *Hypoderma* is not uncommonly associated with extensive oedematous infiltrations in the submucosa of the oesophagus. It was concluded that these infiltrations must be due to a toxic substance derived from the larva, and as various circumstances showed that an excretion from the larva could not be the cause, these symptoms are presumably due to the presence of dead or injured larvae. For this test two larvae in the first stage were taken from the gullet, and an extract of them made in sterile salt solution and this fluid was then injected under the skin of a calf. In from $\frac{1}{2}$ to 2 hours the calf exhibited symptoms of rose fever, with very marked oedematous infiltrations in the eyelids, anal region, inguinal folds, dewlap and elsewhere in the loose subcutaneous tissue, and these disappeared as in rose fever in a few hours. The author is therefore of opinion that all cases of rose fever are due to *Hypoderma* larvae and that the toxic substance concerned has the effect of causing a marked increase in the secretion of lymph.

HENRIKSEN (K. L.). **Insekterne og Vore Sygdomme.** [Insects and Human Disease.]—Martins Forlag, *Copenhagen & Christiania*, 1919, 226 pp., Price 2 Kr. [Received 13th April 1920.]

This is a semipopular and general review of the rôle played by insects in the conveyance of human disease, both in Northern Europe and in the tropics.

HANSEN (F. P. G.). **Om Sarcoptesskab hos Hesten.** [On Sarcoptic Mange in the Horse.]—*Maanedsskrift for Dyrlaeger, Copenhagen*, xxxi, 1919–20, pp. 289–313.

Mange in the horse caused by *Sarcoptes scabiei* was formerly a rather rare disease in Denmark, but lately it has become not uncommon, most probably owing to the increased importation of Russian horses. This paper also deals with the rôle of this disease during the war and describes the author's experiences in dealing with it.

WESENBERG-LUND (C.). **Insektlivet i ferske Vande.** [Insect Life in fresh waters].—Gyldendalske Boghandel, Nordisk Forlag, *Copenhagen*, 1915, 528 pp. Price 11.25 Kr.

In this voluminous work the author has collected together his many valuable notes on aquatic insects (including Culicids and other Nematocera). The literature on the subject has been consulted with great thoroughness, and the whole forms a very valuable compendium of the known facts on the biology of aquatic insects up to the date of publication (1915).

CRESSON JR. (E. T.). **Dipterological Notes and Descriptions.**—*Proc. Acad. Nat. Sci., Philadelphia,* lxxi, no. 2, April–October 1919, pp. 171–194.

This collection of notes on North American Diptera includes a description of a Tabanid, *Silvius jonesi,* sp. n.

SANBORN (C. E.). **The Chicken Sticktight Flea** (*Sarcopsylla gallinacea,* **Westw.**).—*Oklahoma Agric. Expt. Sta., Stillwater,* Bull. 123, February 1919, 8 pp., 3 figs. [Received 2nd March 1920.]

The information contained in this bulletin on *Echidnophaga* (*Sarcopsylla*) *gallinacea,* Westw., has been noticed elsewhere [*R.A.E.*, B, iii, 148, 232 ; iv, 35].

BISHOPP (F. C.) & WOOD (H. P.). **Mites and Lice on Poultry.**—*U.S. Dept. Agric., Washington, D.C.*, Farmer's Bull. 801, August 1919, 30 pp., 14 figs. [Received 3rd March 1920.]

This is a revised version of a bulletin previously noticed [*R.A.E.*, B, vi, 14].

In place of the sulphur ointment suggested for the treatment of poultry infested with the mite, *Cnemidocoptes gallinae,* Raill., a dip consisting of 2 oz. of flowers of sulphur and ½ oz. of laundry soap to 1 U.S. gal. of water is advocated.

The birds should be completely submerged and the feathers ruffled. The dip must be stirred during the treatment to keep the sulphur in suspension. The addition of ¾ oz. of sodium fluoride makes the dip equally effective against lice.

In dipping pigeons in sodium fluoride about ¾ oz. to 1 oz. of laundry soap should be added to each U.S. gal. of water to ensure penetration of the dip.

HACKER (H. P.). **F.M.S. Malaria Bureau Reports.**—*Singapore,* i, November 1919, 76 pp., 22 figs., 2 plans. [Received 10th March 1920.]

Various districts of the Federated Malay States, including Kuala Lumpur and Gemas, have been surveyed with the object of ascertaining the prevalence of Anophelines and the practicability of anti-malaria work.

The following species were found :—*A. maculatus, A. karwari, A. subpictus* (*rossi*), *A. kochi, A. tessellatus, A. aconitus, A. fuliginosus, A. barbirostris, A. hyrcanus* (*sinensis*), *A. leucosphyrus, A. aitkeni, A. umbrosus, A. hunteri, A. novumbrosus,* and *A. albotaeniatus* var. *montanus.*

*A. maculatus* proved to be the most abundant species ; *A. aitkeni* and *A. leucosphyrus* were generally found in the jungle and secondary growth ; the other species usually infested the open floors of the ravines. The larvae of *A. maculatus* were chiefly found in the fresh spring or seepage waters which occur in the cuttings, embankments and cross drains of the railway. This is probably the permanent source of infestation in Kuala Lumpur from which other sources of fresh water become infested. This species does not breed under the shade of secondary growth or jungle, but as the slightest opening will give rise to conditions favourable to it, care must be taken to produce uniform shade when utilising vegetation as a preventive measure against *A. maculatus*. *A. hyrcanus* is also a light-loving species. *A. subpictus* was generally met with in stagnant pools. *A. umbrosus* is not limited to the coastal area as was thought ; it is also abundant as far inland as Gemas.

The incidence of malaria coincides approximately with the percentage of *A. maculatus* present, suggesting that this species is a more dangerous one than *A. karwari*.

The suggestions for the possible prevention of malaria include the education of engineers in antimalarial measures, the filling of swamps, which should always be begun at the upper end of them, ravine drainage and the oiling of breeding-places. If the jungle is to be felled, it should first be well drained, or an attempt made to keep the ravines which contain practically all the water under the original jungle so as to prevent the entry of *A. maculatus*. The ravines should be cleared of timber as quickly as possible before oiling so that no small pools or seepage areas are missed. Likely artificial breeding-places such as empty tins and collections of water should be cleared up. It is not considered necessary to form a complete film of oil to ensure the death of the larvae, as mere contact with oil is sufficient to destroy them. Better results have been obtained where fresh oil was used by means of a continous drip than in the areas where an attempt was made to cover the water surface and the oil only renewed weekly or at longer intervals. Experiments that are being made in the mode of action of the oil will be published later.

GEDOELST (L.). **Un Cas de Parasitation de l'Homme par l'*Hymenolepis diminuta* (Rudolphi).**—*C. R. Soc. Biol., Paris*, lxxxiii, no. 7, 21st February 1920, pp. 190–192.

A case of infestation of man by the tape worm, *Hymenolepis diminuta*, is recorded. The patient had spent about 3 years in the Congo and returned to Belgium towards the end of 1919, shortly after which the infestation became apparent.

The normal hosts of this parasite are *Mus norvegicus*, *M. rattus*, *M. alexandrinus*, *M. musculus* and *M. sylvaticus*, etc., and it requires from 15 to 19 days for its complete development. The larval stage develops in various insects such as *Pyralis* (*Asopia*) *farinalis*, *Anisolabis annulipes*, *Akis spinosa*, *Scaurus striatus*, and the fleas, *Ceratophyllus fasciatus* and *Xenopsylla cheopis* ; in the case under consideration it is thought to have been transmitted by the last-named. infection having probably been acquired on the boat returning to Belgium or in the country itself.

ATHANASSOF (N.). **Destruicao dos Carrapatos no Gado Vaccum por Meio dos Banhos Carrapatecidas.** [Cattle Tick Destruction by Dipping.]—*Secretaria Agric., Comm. e Obras Publicas, São Paulo*, 1919, 12 pp., 1 plate. [Received 2nd March 1920.]

No new methods against ticks are advocated in this bulletin. *Boophilus* (*Margaropus*) *annulatus* var. *microplus* is the most common cattle tick in Brazil, but *Amblyomma cajennense*, *Rhipicephalus sanguineus* and other species also occur.

Metalnikoff (S.). **Sur la Digestion des Bacilles tuberculeux dans le Corps des Chenilles des Mites des Abeilles** (*Galleria mellonella*).—*C. R. Soc. Biol., Paris*, lxxxiii, no. 8, 28th February 1920, pp. 214–215.

It has been shown that tubercle bacilli are rapidly phagocytised by leucocytes in the caterpillars of *Galleria mellonella* (bee moth) [*R.A.E.*, A, viii, 163]. To understand the later developments, examinations have been made that show that the bulk of the bacilli injected are in the centre of large and small capsules formed by groups of leucocytes. The complete destruction of the bacilli takes place in these, and they are gradually transformed into a brownish-black mass. It is easy to distinguish all the intermediate stages between a normal bacillus that can be stained by Ziehl and bacilli that have been digested and turned into pigment. When the caterpillars have been injected with great numbers of bacilli, often in solid masses, digestion proceeds much more slowly, so that some days after injection isolated tubercle bacilli may be found together with large masses transformed into pigment. This explains why guinea-pigs injected with extracts taken from larvae after eight hours' inoculation have acquired tuberculosis [*loc. cit.*], but does not by any means disprove the rapid digestion of the tubercle bacilli.

It is clearly proved, therefore, that the caterpillars possess an extraordinary immunity against the tubercle bacillus and that this immunity is due to certain ferments in the bodies of the phagocytes. All attempts to isolate these ferments and use them as a remedy have as yet been unsuccessful.

Paillot (A.). **L'Immunité acquise chez les Insectes.**—*C. R. Soc. Biol., Paris*, lxxxiii, no. 9, 6th March 1920, pp. 278–280.

While it is admitted that invertebrates, as well as vertebrates, can be immunised against infection by microbes, no decisive proof of this has been obtained, and the existence of anti-bodies like those found in the blood of vertebrates is still problematical. In the case of insects the author has not been able to confirm the conclusions of Cantacuzène (who showed that invertebrates, especially marine Crustacea, could elaborate anti-bodies), but he has seen cases of natural immunity exclusively due to the action of anti-bodies in the blood [*R.A.E.*, A, vii, 486], and a case of acquired immunity is here described.

When caterpillars of *Agrotis* are inoculated with an emulsion of *Bacillus melolonthae non-liquefaciens* of recent culture, fatal septicaemia rapidly supervenes; the only other reaction is a slight phagocytosis. If, however, a culture two or three months old is used the caterpillars successfully resist inoculation, and a further inoculation made 24 hours or even several days after the first, with a fresh culture, does not produce fatal septicaemia. Regular examinations of the blood show that after about 10 minutes a certain number of the bacilli transform into granules; this process extends gradually to all the free bacilli. While the reaction is going on, the micronucleocytes envelop the intact microbes and the granules, but the normal, enveloped microbes do not transform into granules in the protoplasm, and this indicates that the anti-body or bodies in the blood do not arise directly from the micronucleocytes, that is, from the elements that are believed to destroy micro-organisms in the blood of the higher vertebrates. The reaction ends after about five hours.

It is difficult to explain why the production of anti-bodies is more rapid and more intense in the case of insects than in vertebrates; the reverse would be expected. The author has previously suggested the hypothesis that in insects the anti-bodies may be elaborated by the macronucleocytes, that is, by the elements that alone influence the cellular reaction of karyokinesis, but this has not yet been decisively proved. The study of immunity reactions has, however, only just begun, and it is hoped that the process in the case of insects may soon be clearly understood.

JOYEUX (C.). **Culicides récoltés par la Mission antipaludique de l'Armée d'Orient en 1918.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 2, 11th February 1920, pp. 117–126.

The anti-malarial mission established with the Balkan Army in 1918 made a comprehensive collection of the various mosquitos of those regions, comprising parts of Macedonia, Albania and Greece. These are listed in a table, showing the localities in which they were found, the numbers of each and the stage in which they were captured.

The Anophelines are represented by the same four species that were observed in 1917. *Anopheles maculipennis*, Meig., is common everywhere and especially in the Vardar region; the larvae, however, do not find favourable conditions in the brackish water fed by the tide. Hibernation occurs in the adult stage. The index of Anopheline infection with malaria was found to be 0·86 per cent., from dissections made only after the outbreak of the malarial epidemic. The percentage of infected Anophelines is the same throughout the country and the degree of salubrity of any region depends entirely upon the number of Anophelines found there. The average infection in 1917 was 2 per cent.; the Anopheline index seems therefore to have dropped in 1918, perhaps owing to the quinine prophylaxis among both troops and natives.

*A. bifurcatus*, L., appears in March and April and more rarely later on, though in the Albanian region it is frequently found, and sometimes abundantly, in August and September. This agrees with the findings of Feytaud and Gendre [*R.A.E.*, B, vii, 122] and others in France. *A.* (*P.*) *palestinensis*, Theo., is fairly evenly distributed and generally much less abundant than *A. maculipennis*. According to various investigators, it hibernates in either the larval or adult stage. The author agrees with those writers who consider *A. superpictus* var. *macedoniensis* to be a synonym of this species. *Anopheles hyrcanus*, Pall. (*sinensis*, Wied.) is rare.

Culicines observed include *Stegomyia fasciata*, F. (*calopus*, Meig.), which seems to occur only near the coast; *Theobaldia longiareolata*, Macq. (*spathipalpis*, Rond.), fairly abundant at all seasons; *T. annulata*, Schrank, the larvae of which are found from March onwards, apparently hibernating in this stage, and readily adapting themselves to salt water; *T. fumipennis*, Steph., occurring rarely in salt water and apparently hibernating in the larval stage; *Ochlerotatus dorsalis*, Meig., the larvae of which develop in clear or foul water or in brackish pools; *Culex pipiens*, L., abundant in all regions; *C. hortensis*, Fic., the larvae of which are numerous in clean water and also occur in a salt-water lake; adults of this species reared in captivity could not be induced to feed either on animals or on various fruits; *C. apicalis*, Adams, of which *C. territans*, Wlk., *C. saxatilis*, Grossb., and *C. pyrenaicus*, Brole., are considered to be synonyms, shows an affinity for clear water and occurs with *Anopheles bifurcatus*; *Taeniorhynchus richiardii*, Fic., which occurs abundantly during the warm months, ovipositing in fresh or salt water, the larvae attaching themselves to the roots of aquatic plants [*R.A.E.*, B, vii, 103]; and *Uranotaenia unguiculata*, Edw., of which a single larva only was captured in August, though the adults were common in 1917 from June to September throughout Macedonia and in Albania. Hibernation apparently occurs in the larval stage.

Laveran (A.) & Franchini (G.). **Contribution à l'Etude des Flagellés des Culicides, des Muscides, des Phlébotomes et de la Blatte Orientale.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 2, 11th February 1920, pp. 138–147, 5 figs.

From a number of *Culex pipiens* taken in the town and environs of Bologna, none of those from the city itself was found to be infected, but of those from the environs 1 per cent. contained flagellates in the digestive tube; these were invariably females and had imbibed mammalian blood. Individuals of *Anopheles* showed a higher percentage of infection, but do not come within the scope of this paper.

The flagellates found included *Herpetomonas*, *Crithidia*, and *Trypanosoma*. The forms of the parasites are described. Mice inoculated with these flagellates became infected, their blood being also infective when injected into other mice. It is noticeable that the three parasites have been found in the same individuals of *C. pipiens*, and it is not yet determined whether a triple infection occurs or whether they are all forms of the same organism. In support of this latter hypothesis it is remarked that in these preparations of flagellates taken from *C. pipiens* elements have been observed strongly resembling intermediates between these types of flagellates.

The same problem arises in the case of flagellates of Muscids. Flagellates have been found in the digestive tubes of *Calliphora erythrocephala*, *Ceroxys crassipennis* and *Sarcophaga haemorrhoidalis*. Of some twenty individuals of *S. haemorrhoidalis*, ten were found infected with flagellates which were apparently identical with *Herpetomonas sarcophagae*, Prowazek. The forms of flagellates found in these three species of flies are described and agree very closely with the description of *H. muscae-domesticae*, Burnett. Close search failed to reveal any form of *Crithidia* or *Trypanosoma*, though a mouse inoculated in the peritoneum with flagellates from *S. haemorrhoidalis* showed a trypanosome infection to which it succumbed. This co-existence of *Herpetomonas* and *Trypanosoma* in the digestive tract of Muscids has frequently been observed, and other investigators have recorded rearing pure cultures of both *Herpetomonas* and *Trypanosoma* from the same individual of *Drosophila* sp. This, however, does not entirely solve the problem, and it seems possible that the transformation from *Herpetomonas* into *Crithidia* or *Trypanosoma* might be produced under different conditions. It is important therefore, that the conditions under which the experiments are carried out should be varied before any definite conclusion can be reached.

From 200 *Phlebotomus papatasii* examined, flagellates, apparently *Herpetomonas*, were found in four cases in the digestive tract, though in only one case was the infection strong. The forms of the parasite are described. Peritoneal inoculation into a mouse produced an infection which caused death.

In the digestive tract of an oriental cockroach, *Blatta* (*Periplaneta*) *orientalis*, a new flagellate was found, which is designated *Herpetomonas periplanetae*. This parasite, the characteristics of which are described, was found in only one individual out of 20 examined. When inoculated into the peritoneum of mice, it proved pathogenic, and inoculations from the liver or spleen of the infected animal into others produced the characteristic infection; while young mice are fairly resistant to the parasite, older ones readily succumb.

SENEVET (G.). **Contribution à l'Etude des Ixodes. Adaptation biologique des Ambulacres de la première Paire de Pattes.**—*Bull. Soc. Path. Exot., Paris*, XIII, no. 2, 11th February 1920, pp. 147-155, 2 figs.

The author has made a study of the pad found at the extremity of the feet of certain ticks. The presence of this pad is one of the characters separating the family IXODIDAE from the ARGASIDAE; the former exhibit in every stage of their evolution pads on different pairs of feet, while the latter if they possess the pads in the larval state, lose them in the nymphal or adult state. It is known that the larvae of *Boophilus annulatus* var. *calcaratus*, Neum., crawl shortly after hatching to the top of a blade of grass, to which they attach themselves by the posterior pair, of legs, leaving the first pair free. If a possible host-animal passes, the ticks become violently agitated, seeking to attach themselves to it. This would explain the development of these organs for fixation. A large number of ticks were examined and the pads measured, thus arriving at an average measurement for various species in various stages. The results of these examinations are given in a table, and include measurements of *Ixodes ricinus*, L., *I. hexagonus*, Pack., *Rhipicephalus sanguineus*, Latr., *Dermacentor reticulatus*, F., *Amblyomma cajennense*, F., *A. variegatum*, F., *Boophilus annulatus calcaratus*, Neum., *B. annulatus microplus*, Neum., *Ixodes canisuga*, Johns, *Argas reflexus*, F., *Ornithodorus talaje*, Guér., *Rhipicephalus bursa*, C. & F., and *Hyalomma aegyptium*, L.

It is found that the development of the pads on the first pair of legs is the rule in the larval stage; among species belonging to the same genus (*Ixodes*) some follow the rule and some are exceptional. This differentiation of the first pair of legs decreases towards the adult stage, while remaining marked in certain groups. The hypothesis of the adaptation of the pads to the biology of the tick seems to be clearly proved, at least for the species studied. It is pointed out also that the presence of this pad forms an anatomical character of great importance in the classification of larvae, and also provides a method of recognising approximately the mode of life of a tick that has hitherto been unknown. It is sufficient to examine a few adult individuals and to measure the area of the pad. A formula is given for calculating the relation of the area of each of the pads to that on the first pair of legs multiplied by 100, this proportion being called the index. Until proof has been obtained to the contrary it may be taken that an index of less than 80 for the fourth pair of legs indicates an Ixodid with three hosts, while an index of more than 80 for the fourth pair denotes an Ixodid with one or two hosts.

VAN SACEGHEM (R.). **Observations sur la Dermite granuleuse.** [Notes on Granular Dermatitis.]—*Ann. Méd. Vét., Brussels*, lxv, no. 3, March 1920, pp. 135–136.

A large number of cases of a form of granular dermatitis in horses and donkeys in the Belgian Congo have been observed to be caused by a Nematode, *Filaria irritans*. Both species were infested in about equal numbers, the attacks beginning in October. The life-history of the parasite is not known.

Towards February the sores develop a tendency to heal, probably because the Nematode has finished its evolution in the wound. Surgical treatment, at any rate in Africa, is unadvisable owing to the danger of myiasis.

MAYNE (J. F.) & JACKSON (W. R.). **Larvicides.**—*Jl. R.A.M.C., London*, xxxiv, no. 2, February 1920, pp. 112–120.

Experiments were made in Macedonia with various substances to test their relative value as mosquito larvicides. The most common species found include: *Anopheles maculipennis*, *A. bifurcatus*, *A. palestinensis* (*superpictus*), *A. pseudopictus*, *Theobaldia longiareolata* (*spathipalpis*), *T. annulata*, *Culex mimeticus*, *C. pipiens* and *C. hortensis*.

The tests made with paraffin show that its action is quicker when thoroughly mixed with the water than when applied as a film, owing to the toxicity of the substance which directly effects the larvae. Experimentally the larvae were killed in 1 hour and 20 minutes when the paraffin was mixed with the water, whereas when applied as a superficial film they lived for 5 hours. The pupae on the contrary are killed in ½ hour when the oil is applied as a film but survived for 3 days in paraffin and water.

Cresol proved most satisfactory as a larvicide, 1 part in 1 million or even 1 in 10 million being sufficient to kill all larvae of *Culex*, Anophelines requiring rather stronger solutions. The water containing such a small amount of poison is probably innocuous. Pupae are more resistant to cresol than larvae, but it was specially effective against the egg-rafts, the minute larvae on hatching being killed by 1 part in 100 million.

Sanitas-okol is poisonous to man and animals, and is apparently not nearly so efficient a larvicide as cresol.

Bleaching powder, although useful in an emergency in varying proportion from 1 in 1,000 parts to 1 in 100,000 parts, is too unstable for general use; carbolic acid also gave disappointing results.

ANTHONY (A. L.). **A simple Form of Fly-proof Latrine as used in West Africa.**—*Jl. R.A.M.C., London*, xxxiv, no. 2, February 1920, pp. 141–143, 5 figs.

A method of constructing a simple fly-proof latrine is described and illustrated. Its efficacy depends on the depth to which it is dug, the pit recommended having a minimum depth of 15 feet.

SEWELL (E. P.) & MACGREGOR (A. S. M.). **An Anti-Malaria Campaign in Palestine.**—*Jl. R.A.M.C., London*, xxxiv, nos. 2 & 3, February & March 1920, pp. 85–100 & 204–218, 8 figs., 3 charts, 2 tables, 1 map.

This paper deals at length and in detail with the preventive measures undertaken during the anti-malaria campaign in Palestine in 1918 in the 21st Corps area comprising the river Auja and the valley of Sharon [*R.A.E.*, B, viii, 51, 60, 70]. This area included about 250 sq. miles which had to be examined and watched for mosquito breeding. For the most part the district is waterless, with the exception of two large marshes formed by the winter rains and these offered ideal breeding grounds for mosquitos. The three main lines adopted for the defence of the troops from malaria are removal of the reservoirs in the persons of infected soldiers and potentially infected natives ; the destruction of the carrier of infection ; and the protection of individuals against infection by bites of Anopheline mosquitos.

*Anopheles bifurcatus* was found sheltering and breeding in wells and cisterns in midwinter and was capable of transmitting subtertian as well as tertian infections. There was a rapid increase of malaria in June, following the appearance of swarms of *A. maculipennis*, which had probably hibernated in caves, etc.

It is estimated that the work, which extended over six months, would have cost about £40,000 had civilians been employed, and had it not been carried out, the victory over the Turks would have been impossible. Owing to the vastness of the problem, which is beyond the powers of small agricultural communities, the Government of Palestine will be forced to adopt such measures as are here described if the valley of Sharon is ever to be developed into a prosperous and healthy agricultural country.

MACGREGOR (M. E.). **The Question of Natural Enemies.**—*Jl. R.A.M.C., London*, xxxiv, no. 3, March 1920, pp. 248–250.

The value of the utilisation of natural enemies of insect pests is discussed, especially in reference to fish as destroyers of mosquito larvae. The author has no faith in them for this purpose owing to the extent to which they depend on the surrounding conditions. Mechanical and chemical agents that render the conditions unsuitable for larval development are far more important factors in control.

MACKIE (F. P.). **The Transmission of relapsing Fever.**—*Brit. Med. Jl., London*, no. 3089, 13th March 1920, pp. 380–381.

Although the ordinary carrier of recurrent fever is the louse [*Pediculus humanus*], this intermediate host is not essential to the development of the spirochaete. Several cases of direct transmission from man to man have occurred under exceptional circumstances, such as by contact with, and subsequent absorption of the virus from, freshly shed infective blood, and the possibility of direct infection is proved by experiments here described.

Scott (J. W.). **Experimental Transmission of Swamp Fever or Infectious Anemia by means of Insects.**—*Jl. Amer. Vet. Med. Assoc., Washington, D.C.*, ix, no. 5, February 1920, pp. 448–454.

Feeding experiments have shown that swamp fever is not transmitted naturally by way of the alimentary canal. Inoculation is possible through scratches or cuts in the skin or by agents actually carrying infected blood from one horse to another, such as is known to be true of certain biting insects.

Abrasions of the skin are, however, excluded as avenues of infection, as they do not conform in incidence to the seasonal occurrence of swamp fever. Lice, scab mites and ticks are eliminated on similar grounds. The only other agents in Wyoming are mosquitos and certain biting flies.

Experiments with mosquitos gave negative results, but experiments with *Stomoxys calcitrans* and *Tabanus septentrionalis,* so conducted as to eliminate other possible sources of infection, showed that these flies, and probably certain other biting flies, are capable of transmitting the disease to horses. Consequently remedial methods should be on the following lines. Cases of swamp fever should be killed or carefully isolated, particularly in the season when flies are abundant, and the bodies of horses that have died of the disease should be burned or buried. Suspected horses should be carefully watched, but healthy carriers probably afford the most important method of spreading the disease. Their detection is very difficult. If detected, they should on no account be moved from one place to another. All movements of horses from an infected area, during or some time after the infective season, should be suspended. Horses introduced from such an area should be isolated for at least three months and kept under observation [see also *R.A.E.*, B, vii, 165].

Herms (W. B.). **What shall we do with our Information concerning Malaria in California?**—*Mthly. Bull. California State Bd. Health, Sacramento,* xv, no. 6, December 1919, pp. 181–189. [Received 22nd March 1920.]

The control of malaria presents the chief rural sanitary problem in California at the present time, although the malaria rate for the State as a whole has been reduced by 60 per cent. in the last ten years. Irrigation need not involve malaria, if correct methods are employed, including in particular adequate drainage. Rice culture in itself need not increase malaria. [*R.A.E.*, B, v, 142.]

Though California's death-rate from the disease (4·8 per 100,000) seems low, the State should not be regarded as a whole to appreciate the position. Thirteen counties (20,000 square miles) harbour three-fifths of the malaria in the State and had in 1916 a death rate of 14·2 per 100,000, which is considerably more than twice as high as that of Mississippi—a notoriously malarial State. In the mosquito survey of California [*R.A.E.*, B, vi, 70] the species of Anophelines collected were *Anopheles quadrimaculatus* (inclusive of *A. occidentalis*), *A. punctipennis* and *A. pseudopunctipennis*. The first two are definitely carriers of malaria, but *A. pseudopunctipennis* may be safely disregarded in malaria control operations. Apart from deficient drainage, breeding-places are afforded, though in a less degree, by the chains of pools in stream beds in summer, and marshes in foothill meadows after melting snow has flooded the mountain streams. Remedial measures produce good results in districts where funds are sufficient ; but over the greater part of the country they are inadequate, the present Act being unable to raise enough in inland districts where the value of land is low, and State aid is therefore essential.

The financial loss to California due to malaria is heavy owing to the loss of efficiency caused [*R.A.E.*, B, vi, 168 ; viii, 64]. The annual amount required for control is about £20,000, which would diminish in a few years, while the annual loss is at least £320,000.

HERMS (W. B.). **Occurrence of Malaria and Anopheline Mosquitoes in Middle and Southern California.**—*Mthly. Bull. California State Bd. Health, Sacramento*, xv, no. 7, January 1920, pp. 211–216. [Received 22nd March 1920.]

This is a report of some of the work done in the malaria-mosquito survey of California [*R.A.E.*, B, vi, 70]. Tables are given showing the population of the various districts, the malaria death rate, the occurrence and distribution of Anopheline mosquitos in general, and of each kind in particular. *Anopheles quadrimaculatus* and *A. punctipennis* are regarded as effective carriers, while *A. pseudopunctipennis* is negligible. The conclusions drawn show that the relation between potentially effective Anopheline carriers alone and the malaria rate should not be exaggerated. There are many other factors, such as temperature or proximity of population to Anopheline foci, to be considered.

FREEBORN (S. B.). **The Business of Malaria Control.**—*Mthly. Bull. California State Bd. Health, Sacramento*, xv, no. 7, January 1920, pp. 217–220. [Received 22nd March 1920.]

The author's summary of this paper is as follows :—

The average rural district under the administration of the Mosquito Abatement District Act will return 4½*d.* an acre in taxes. Mosquito control work on 21 projects costs on the average £10 an acre. Legislation authorising the levying of taxes for purposes of malaria control on the basis of assessed benefits, with relief from responsibility constituting a benefit, will raise sufficient funds and place the cost on the responsible parties. In a few rural districts that constitute the "sore spots" of malaria, the problem is too difficult to be handled by the taxpayers. For these districts the State should appropriate a sum of money, payable over consecutive years, for the control of the work.

CHIDESTER (F. E.). *Anopheles quadrimaculatus* **and** *Anopheles punctipennis* **in Salt Water.**—*Science, Lancaster, Pa.*, li, no. 1314, 5th March 1920, pp. 244–245.

During observations made in Virginia, *Anopheles quadrimaculatus* and *A. punctipennis* were frequently reared from larvae found in brackish water the specific gravity of which was 1·0048 and 1·0058.

LOFTIN (U. C.). **Mosquitoes found about Gainesville, Fla. Mosquitoes and Disease.**—*Florida Buggist, Gainesville*, iii, no. 3, December 1919, pp. 37–43 & 48–50. [Received 27th March 1920.]

The relations between mosquitos and such diseases as malaria and yellow fever are discussed. The most active enemies of mosquitos in Florida are the minnows, *Gambusia affinis* and *Chaenobryttus gulosus*. The usual remedial measures against both adult and larval mosquitos are reviewed and recent drainage operations in various States are described.

BANKS (C. S.). **The Swarming of Anopheline Mosquitoes.**—*Philippine Jl. Science, Manila*, xv, no. 3, September 1919, pp. 283–288. [Received 24th March 1920.]

The swarming of mosquitos has been constantly reported, but no mention seems previously to have been made of this habit in the case of Anophelines. Swarms of *Anopheles subpictus*, Grassi (*Myzomyia rossi*, Giles) were observed in March 1917, but detailed observations were not made until 1919, when swarms of these mosquitos were seen on the evenings of 4th, 5th, and 6th March. The observations were most complete on 6th March. At 6.15 p.m. a few males were observed and in ten minutes three clusters, numbering several thousands, all males, had formed. Between 6.30 and 6.40 about fifty females entered the swarm, and were seized by males, the pairs flying slowly but directly out of the swarm. In another ten minutes the whole swarm had dispersed.

A remarkable feature of this phenomenon was the occurrence of a stiff breeze on each occasion. Thus it appears that, in spite of a general opinion to the contrary, Anophelines can maintain their position, and fly easily in any direction in an eight- or nine-mile-an-hour wind. They could even more easily allow themselves to be carried by the wind for considerable distances, while the ability they displayed in evading capture would enable them to avoid injury in passing among trees or similar objects.

This swarming of Anophelines was observed on one occasion near the College of Agriculture less than two hundred yards to windward of a creek which is an ideal breeding-place for *Anopheles minimus* (*M. febrifer*), but separated by a thick bamboo grove. Malaria is most prevalent in the dry season, and if *A. minimus* has the same powers of flight as *A. subpictus*, its range of activities would be limited by only two factors, gamete carriers and the number of individuals exposed to attack.

Johnson (C. W.). **On the Variation of *Tabanus atratus*, Fabricius.**—*Psyche, Boston, Mass.*, xxvi, no. 6, December 1919, pp. 163–165.

*Tabanus atratus*, F., which is distributed along the Atlantic coast from Maine to Florida is subject to considerable variation, but this is apparently confined to the immediate seaboard, where the species probably breeds in brackish marshes. *Tabanus nantuckensis*, Hine, which is apparently confined to the New England coast, is only a variety of *T. atratus*, another being *T. atratus* var. *fulvipilosus*, var. n., from Florida and New Jersey.

Similar though less pronounced variations occur in *Tabanus trispilus* and *Chrysops fuliginosus*.

Ludlow (C. S.). **New Mosquitos from Panama.**—*Psyche, Boston, Mass.*, xxvi, no. 6, December 1919, pp. 166–169.

The new species, described from the females only, are :—*Anopheles* (*Stethomyia* ?) *niveopalpis*, and *Trichoprosopon* (*Joblotia*) *shropshirei.*

Carter (H. R.). **The Mechanism of the Spontaneous Elimination of Yellow Fever from Endemic Centres.**—*Ann. Trop. Med. Parasit., Liverpool*, xiii, no. 4, 15th March 1920, pp. 299–311.

In tropical America, yellow fever is eliminated north and south of a central zone by the death or inactivity of *Stegomyia* due to cold weather. It has also been eliminated in places within the zone by sanitary measures. In the latter case the destruction of *Stegomyia* is not absolute. If the number of mosquitos is brought below the "critical number" for yellow fever, the disease dies out. This number varies directly as the proportion of individuals immune to yellow fever to the total population. But in a large number of places in the zone yellow fever has disappeared for a number of years or entirely, though no sanitary measures were taken, and the question arises as to what the mechanism of this spontaneous elimination may be.

The parasites occur only in an infected mosquito during its life (say ten days), and in man for only a short time while his blood is infective to mosquitos. Consequently susceptible persons are necessary for the continuance of the disease. If yellow fever produces in general a permanent immunity (to a rather less degree this will be true of only a temporary immunity) the disease will eventually be eliminated from a community by the failure of the human host, unless there is a sufficient number of susceptible new-comers (immigrants or infants) for its continuation.

Yellow fever may obviously be introduced again into such a community after the proportion of immune persons has become smaller, but there seems to be no evidence of the existence of any reservoirs, analogous to those that occur in trypanosomiasis, though isolation from infected places is necessary. Elimination by insect control, unless it becomes more and more intensive, is subject to the same objection. As the proportion of susceptible persons increases, a greater destruction of *Stegomyia* is necessary to keep a town free from yellow fever than was originally the case. In tropical America numerous influences, economic and otherwise, by diminishing the arrivals of susceptible Americans and Europeans have helped the tendency to natural elimination. Many places in which yellow fever exists will need very little sanitary work to turn the scale against it, and the freeing of one place frequently prevents the infection of another.

Facts such as these justify the plan of the International Health Board for the elimination of yellow fever from the earth—the first attempt to exterminate a micro-organism pathogenic to man.

Blacklock (B.) & Carter (H. F.). **The experimental Infection in England of** *Anopheles plumbeus*, **Stephens, and** *Anopheles bifurcatus*, **L., with** *Plasmodium vivax*.—*Ann. Trop. Med. Parasit., Liverpool,* xiii, no. 4, 15th March 1920, pp. 413–420.

Examination of the literature seems to show that there is no previous evidence that *Anopheles plumbeus* is an agent in the carriage of malaria.

Further experiments [*R.A.E.*, B, vii, 160] show that it is not difficult to infect *A. plumbeus* with *Plasmodium vivax*. At 28°C. (82·4°F.) infections of the gut and salivary glands were obtained ; at room temperature (max. 26°C. (78·8°F), min. 17°C. (62·6°F.) ) gut infection only was obtained. In the case of *A. bifurcatus* gut infection only was produced at 28°C (82·4°F).

Blacklock (B.). & Carter (H. F.). **Observations on** *Anopheles* (*Coelodiazesis*) *plumbeus*, **Stephens, with special reference to its Breeding Places, Occurrence in the Liverpool District, and possible Connection with the Spread of Malaria.**—*Ann. Trop. Med. Parasit., Liverpool,* xiii, no. 4, 15th March 1920, pp. 421–444, 3 plates, 2 maps.

The synonymy of *Anopheles plumbeus* and its relationship with other Anophelines are discussed. An account is given of its distribution, the characters and habits of the adult and immature stages and the breeding-places (rot-holes in trees). Maps show the localities in which it is known to occur in the British Isles and in the Liverpool district in particular.

The authors are of opinion that *A. plumbeus* is worthy of serious consideration as a natural carrier of malaria. In country districts or woodlands frequented by the public the possibility of its disseminating the disease can be readily appreciated. But in towns or villages away from large woods the extent to which it occurs can only be decided by careful surveys for breeding places.

The adult habit of resting in rot-holes in trees renders any conclusion drawn from an adult mosquito census elsewhere entirely misleading, and this may also cause the degree of its domestication to be underestimated, since the insects would only stay in houses long enough to feed. It is therefore desirable to investigate fully the immediate surroundings of any house to which the occurrence of cases of malaria seems peculiarly restricted, with a view to discovering the breeding-places of *A. plumbeus*.

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CARTER (H. F.). **Descriptions of the Male Genital Armatures of the British Anopheline Mosquitoes.**—*Ann. Trop. Med. Parasit., Liverpool*, xiii, no. 4, 15th March 1920, pp. 453–457, 4 figs.

Descriptions and figures are given of the male genitalia of the three British Anophelines :—*Anopheles maculipennis*, Meig., *A. bifurcatus*, L., and *A.* (*Coelodiazesis*) *plumbeus*, Stephens.

YORKE (W.). **On Human Trypanosomiasis in Peru.**—*Ann. Trop. Med. Parasit., Liverpool*, xiii, no. 4, 15th March 1920, pp. 459–460.

An account is given of the first recorded case of human trypanosomiasis in Peru [*R.A.E.*, B, viii, 65]. The disease was contracted in the region bordering on Brazil where the Reduviid bug, *Triatoma megista*, and other vectors of trypanosomiasis exist. The trypanosome in question proved to be new and is here named *Trypanosoma escomeli*.

A notable feature of the case was the extreme somnolence of the patient. This feature does not appear to occur in Chagas' disease (due to *Trypanosoma cruzi*), though it is well known in African trypanosomiasis in man.

NICOLLE (C.) & LEBAILLY (C.). **Contribution à la Connaissance de l'Evolution des Spirochètes de la Fievre récurrente chez le Pou. (Etude des Coupes en Série).**—*Arch. Inst. Pasteur, Tunis*, xi, no. 3, February 1920, pp. 131–137, 1 plate.

The chief points relating to the evolution in lice of the spirochaetes of recurrent fever have been developed and confirmed [*R.A.E.*, B i, 70 ; ii, 132, 200], but some remained uninvestigated. In particular it was not known where these changes take place, only the disappearance of the spirochaetes from the digestive tract and the appearance of new spirochaetes in the blood stream having been observed. It was thought that the various evolutionary stages could be followed to better advantage by making sections of lice fed at variable and successive dates on man or monkeys suffering from recurrent fever.

Examination of the sections confirmed the data previously obtained and showed that the changes occur in the epithelial cells of the fore gut. The pigmentation of these cells prevented the process of breaking-up from being followed, nor was it possible to see how the new spirochaetes passed from the digestive cells to the circulatory system.

The feet of a louse are very fragile and the blood there swarms with spirochaetes. It may therefore be said that an individual inoculates himself with the disease by breaking the feet of the lice he harbours.

The lice used for sections were fixed with formol, treated with alcohol, impregnated with silver nitrate according to the Cajal Levaditi method, and then embedded in paraffin.

GERARD (F.). **A propos de deux Epidémies de Typhus exanthématique.**—*Arch. Inst. Pasteur, Tunis*, xi, no. 3, February 1920, pp. 172–177, 1 plate.

The first of the epidemics here recorded occurred among the Serbs brought to Bizerta in 1916 and was of little importance owing to the sanitary measures adopted.

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The second took place in Rumania in 1916–17, and owing to the disorganisation of the sanitary services due to War conditions there resulted a mortality more terrible than that suffered by the Serbs in 1914–1915, when 230 doctors and 400,000 men died.

LEGENDRE (J.). **Rôle du Bétail et de la Basse-cour dans la Défense contre la Malaria.**—*C. R. Hebdom. Acad. Sci., Paris*, clxx, no. 12, 22nd March 1920, pp. 766–769.

The view is expressed that domestic animals are a source of protection to man against mosquitos, the blood of horses, cattle, pigs and particularly rabbits being preferred by them to that of man. Fowls and ducks are immune from attack, the insects even avoiding oviposition in vessels containing water used by poultry.

AGNOLETTI (G.). **A New Parasiticide.**—*La Clinica Veterinaria, Milan*, xlii, no. 4, 28th February 1919, p. 109. (Abstract in *Mthly. Bull. Agric. Intell. & Pl. Dis., Rome*, x, no.5, May 1919, p. 576). [Received 31st March 1920.]

Extensive experiments have proved that the use of an ointment prepared from thiometa-methylene is the best remedial measure for horses infected with mange. This substance is prepared by acting on ammonium thiocarbonate or ammonium sulphide with sodium methansulphoxylate in the presence of acid. It has the property of slowly splitting up into formic aldehyde, sulphuretted hydrogen and sulphur, and has therefore a combined antiseptic and insecticidal action.

One application proves sufficient to cure the disease in horses, mules and dogs, and no injury to the hair was noticed in any of the cases treated. Sodium sulphide was added to the ointment, to ensure the penetration of the active principle through the skin.

JORDAN (K.) & ROTHSCHILD (N. C.). *Ectoparasites, London*, i, no. 2, 20th January 1920, pp. 61–125, 39 figs.

This volume contains the following systematic papers: On the species and genera of Siphonaptera described by Kolenati; on American *Ceratophyllus* infesting birds; a preliminary catalogue of the Siphonaptera of Switzerland; and a new *Ctenophthalmus* from Macedonia.

MOHLER (J. R.). **Report of the Chief of the Bureau of Animal Industry.**—*U.S. Dept. Agric. Washington, D.C.*, 29th September 1919, 63 pp. [Received 3rd March 1920.]

During the year ended 30th June 1919 the Field Inspection Division supervised 10.518.196 dippings for the purpose of eradicating scabies in sheep. Great progress in this direction has been made in Iowa and Michigan, the disease having been practically exterminated. Montana and North Dakota have been free from the disease, and the outbreak in Idaho has been brought under control. Dippings for cattle scabies show an increase of 46 per cent. over the numbers of the preceding year, making a total of 935,539. The disease is being brought under control in Kansas and effective work is being done in the new areas of infection in southwestern New Mexico, but in Texas and Montana it has been more prevalent than in previous years. Of 414 horses and mules inspected for scabies 74 were dipped under Bureau supervision.

Greater progress than in any previous year has been made with regard to cattle tick [*Boophilus annulatus*] extermination. Areas aggregating 79,217 sq. miles have been freed from ticks and released from quarantine, and 47,843,791 inspections or dippings were made, as against 34,927,959 in the previous year, 33,789 cattle dipping vats being in operation.

In connection with studies on the transmission of hog cholera it has been found that under ordinary conditions the hog louse, *Haematopinus suis*, is incapable of transmitting the virus. It is also doubtful whether the house-fly, *Musca domestica*, is concerned with the dissemination of the disease under natural conditions, although it may harbour the virus for some days and possibly may infect animals by feeding on their eyes or fresh wounds. Experimentally the stable fly, *Stomoxys calcitrans*, has conveyed the disease by biting healthy pigs after feeding on the ears of infected animals or by being crushed and placed in the feeding trough after being gorged with blood of diseased pigs. It has not however been determined whether this fly is a factor of practical importance in the spread of the disease.

The work of the Zoological Department, consisting of the investigation of parasitic diseases of animals and the study, collection and determination of animal parasites, has been continued. Investigations show that mange on pigs is spread chiefly by direct bodily contact and may be controlled by four dippings in lime-sulphur or arsenical solutions at intervals of from 6 to 7 days. One dipping of crude petroleum or cottonseed oil proved sufficient for the eradication of lice on pigs. Medicated pig wallows are an effective and convenient means of treating pigs for lice and mange in hot weather. Experiments in the treatment of sarcoptic mange in cattle and the ear tick [*Ornithodorus megnini*] confirm those of the previous year [*R.A.E.*, B, vii, 92, 93.]

KELLOGG (V. L.) & FERRIS (G. F.). **The Anoplura and Mallophaga of North American Mammals.**—*Leland Stanford Junior Univ. Public., Univ. Series, Stanford Univ., Cal.*, 1915, 74 pp., 8 plates, 18 figs. [Received 3rd March 1920.]

This paper deals with 31 species of Anoplura, including 10 new species and 2 new varieties, and 29 species of Mallophaga, including 1 new species. It also contains a key to the families, subfamilies and genera of Anoplura, as well as a mammalian host list of North American Anoplura and Mallophaga.

CARPENTER (G. D. H.). **Third, Fourth and Fifth Reports on the Bionomics of *Glossina palpalis* on Lake Victoria.**—*Repts. Sleeping Sickness Commission Royal Soc., London*, no. 17, 1919, 101 pp. 4 figs, 6 charts, 1 map. [Received 10th March 1920.]

A description is given of a tour made from January to March 1914 among the islands lying parallel to the coast of Lake Victoria between Entebbe and Jinja, with the object of ascertaining the factors that cause *Glossina palpalis* to vary in abundance on different islands. As a result of this inspection, the conclusion was reached that to support *Glossina* an island must be of a certain minimum size, however suitable it may be in other ways, and moreover must have a certain amount of good shade in proportion to its area. If there is good shade near water its absence elsewhere is immaterial. Vegetation that grows too densely, as in the case of papyrus, is not associated with great numbers of the fly. The percentage of females caught seems to indicate the accessibility of food supply, and probably variations in the amount of blood available will influence the numbers of the adult fly, by affecting the rate of reproduction. Shade produced by fresh green growth is at once made use of by the fly for larviposition, hence pupae may be localised according to the changing conditions of vegetation, while they are readily killed by diminution of the shade. While breeding-grounds are essential for maintaining a great abundance of fly, a certain number can exist without localised breeding-grounds. It is therefore obvious that clearing away vegetation from the breeding-grounds will not wholly banish the fly. A Chalcid parasite, *Syntomosphyrum glossinae*, has been reared from the pupae, but is very scarce. It is thought probable that certain spiders have been responsible for considerable diminution in the numbers of flies where conditions are apparently favourable for their increase.

Each island visited in the course of this tour is described. The degree of infestation by *Glossina palpalis* and the factors influencing it are discussed at length. It is obvious that clearing is an important factor in control and that it must be very complete. Catching adult flies destroys only a small proportion of females; a method such as sticky cloths on animals would be preferable in localities where males predominate in the catch. The extermination of large mammals would have no effect upon *G. palpalis* which prefers reptilian blood, and the destruction of all crocodiles and other large reptiles would be a difficult matter. The author is of opinion that it is impracticable to infect the fly artificially with any disease with the object of killing them off.

Provided there is an area of good shelter as a base, flies may roam along the shores, presumably in search of food and breeding-grounds, in places where they could not reside owing to lack of shelter.

The collection of pupae seems to offer the most promising results owing to the proportion of the sexes being equal. It is therefore suggested that all breeding-grounds should be cleared and that artificial shelters should be provided that would induce the fly to deposit their larvae in them; from these the pupae could be collected regularly. This method has been tried to some extent and the results undoubtedly warrant further experiment. Such shelters should be in the form of a low lean-to shed, the base and preferably the uprights being of metal, owing to the presence of termites. The low front should face the direction of the prevailing wind; the roof should be thatched with good eaves, almost touching the ground in front; the sides and back should be open but protected by eaves and creepers. If the shelter can be made of fresh, green growth this will add to its attractiveness, and creepers might be planted to ramble over it. Diagrams and photographs of such shelters are given. One of a suitable size has an area of 12′ × 4′ and is $4\frac{1}{2}'$ high at the back and $1\frac{1}{2}'$ in front.

It is obvious that constant attention must be given to such shelters and the pupae regularly collected, otherwise they will tend to the increase of the fly rather than to its diminution. The roofs must be kept watertight. This method cannot be expected to exterminate the fly, though its numbers can be reduced immensely, and where possible the collection of adult flies should be continued. Moreover, in the author's opinion this method is the simplest, the least costly and the most practicable of any as yet proposed for dealing with *Glossina*, and should have the effect of keeping the fly at a minimum harmless number, below which no method, short of defoliating the whole country, could bring it.

DYAR (H. G.). **The Mosquitoes of British Columbia and the Yukon Territory, Canada (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, viii, no. 1–3, January-March 1920, pp. 1–27, 1 plate.

An account is given of the exploration of the Canadian mosquito fauna westward from the Continental Divide, the point reached in the previous season [*R.A.E.*, B, vii, 105].

The mosquitos of this region fall into two distinct groups, those of the Canadian fauna proper, and those of the Pacific coast fauna, which is found in those parts of the Pacific Coast in which peculiar conditions have been evolved, owing to the almost continual rain caused by the moist winds from the Pacific striking the high coastal mountains.

Among those of the Canadian fauna the following occur in addition to most of the species recorded in the previous paper [*loc. cit.*]: *Aëdes pullatus*, Coq., *A. stimulans*, Wlk., *A. mercurator*, sp. n., *A. callithotrys*, sp. n., *A. curriei*, Coq., *A. aestivalis*, Dyar (in the Southern fringe of the Canadian fauna), *A. varipalpus*, Coq., *Theobaldia* (*Culiseta*) *incidens*, Thoms., and *T. alaskaënsis*, Ludl.

The author has revised his opinion with regard to the identification of two species, and to avoid confusion, proposes to use the names *Aëdes territans* (*restuans*) and *A. impiger* (*decticus*).

In the Pacific Coast fauna the conditions have produced an entire change in the species of *Aëdes*, but not in those of *Theobaldia*. Three species of *Aëdes* were observed. *A. cyclocerculus*, sp. n., *A. leuconotips*, sp. n., and *A. aboriginis*, Dyar. Keys are given to these species and to the closely allied *A. punctor* and *A. hexodontus*, Dyar, from California.

DYAR (H. G.). **A second *Culex* of the Subgenus *Transculicia*, Dyar (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.* viii, no. 1–3, January-March, 1920, pp. 27-29.

*Culex* (*Transculicia*) *petersoni*, sp. n., from the Virgin Islands is described. The author considers that from the close similarity of the larva of *C. petersoni* to *C. bahamensis*, D. & K., hitherto known only in the larval stage, it is evident that *C.* (*Transculicia*) *eleuthera*, Dyar, is the adult of *C.* (*T.*) *bahamensis*, the latter name having priority.

DYAR (H. G.). **Note on the Subgenus *Neoculex* of *Culex* (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, viii, no. 1-3, January-March 1920, p. 36.

The characters of the subgenus *Neoculex* are given. To it belong *Culex testaceus*, Wulp, in America, and the European species, *Culex modestus*, Fic., and *C. hortensis*, Fic., the genitalia of these species are described, and their synonyms noted.

DYAR (H. G.). **Notes on European Mosquitoes (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, viii, no. 4–6, April-June 1920, pp. 51–54.

*Aëdes metalepticus*, sp. n., from the Italian Alps is closely related to the Canadian *A. pullatus*. It may possibly be the same as *A. jugorum*, Vill., or *Aëdes alpinus*, L., but the descriptions of these two species are not full enough for a certain conclusion to be drawn. It is considered that *Aëdes nigripes*, Zett., is a synonym of *A. alpinus*.

DYAR (H. G.). **The Species of *Choeroporpa*, a Subgenus of *Culex* (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, viii, no. 4–6, April-June 1920, pp. 54–81.

This group extends throughout the tropics and into the warmer temperate regions in North and South America. Thirty-nine species are noted, the following being new: *Culex* (*Choeroporpa*) *terebor*, *C.* (*Ch.*) *ybarmis*, *C.* (*Ch.*) *phlogistus*, *C.* (*Ch.*) *phlabistus*, *C.* (*Ch.*) *corentynensis*, *C.* (*Ch.*) *vapulans*, *C.* (*Ch.*) *comminutor*, *C.* (*Ch.*) *eastor*, *C.* (*Ch.*) *maxinoeca*, *C.* (*Ch.*) *tosimus*, *C.* (*Ch.*) *raxus*, *C.* (*Ch.*) *bibulus*, *C.* (*Ch.*) *jonistes*, *C.* (*Ch.*) *idottus*, and *C.* (*Ch.*) *xivylis*, all from Surinam. A key, based on characters of the genitalia, is given of the species noticed.

DYAR (H. G.). **A new Mosquito from Mexico (Diptera, Culicidae).**—*Insector Inscitiae Menstruus, Washington, D.C.*, viii, no. 4–6, April - June 1920, pp. 81–82.

*Aëdes* (*Heteronycha*) *muelleri*, sp. n., from Mexico City is described.

FERRIÈRE (Ch.). **Insectes et Epidémies.**—*Rev. Internat. de la Croix-Rouge, Geneva*, ii, no. 2, 15th February 1920, pp. 149–173. [Received 6th April 1920.]

The lessons of the war, and the steps taken by the various nations to combat insect-borne diseases, are reviewed.

The four most important groups of insects are :—Lice, carrying exanthematic typhus, recurrent fever and trench fever; mosquitos, carrying malaria, and yellow fever; fleas carrying plague; and flies, which may be concerned in the spread of typhoid, dysentery, cholera, dipthheria, ophthalmia, infantile paralysis, tuberculosis, and leprosy.

VON BASSEWITZ (E.). **As Sanguesugas do Brasil e a Peste das Cadeiras dos Equinos.** [Brazilian Leaches and Mal de Caderas.]—*Chacaras e Quintaes, S. Paulo*, xxi, no. 3, 15th March 1920, pp. 183–188, 1 fig., 1 plate.

In this article on Brazilian leeches the suggestion is made that in the genus *Haementaria* may be found the vectors, perhaps the exclusive vectors, of the trypanosomiasis in equines known as Mal de Caderas.

WILHELMI (J.). **Die gemeine Stechfliege (Wadenstecher) Untersuchungen über die Biologie der *Stomoxys calcitrans*, L.** [Observations on the Biology of *Stomoxys calcitrans*, L.]—*Monograph. z. angew. Entom.*, no. 2, Supplement to *Zeitschr. f. angew. Entom.*, *Berlin*, iv, 1917, 110 pp., 28 figs. [Received 19th April, 1920.]

This memoir, a notice of which has already been published [*R.A.E.*, B, vi, 174], contains details of the author's personal observations on the local distribution and general habits of *Stomoxys calcitrans*, L. Comparisons are made with observations of previous authors, and these are confirmed in the main. The results of the investigations dealing with the economic importance of the fly in agriculture and with regard to disease are not touched upon.

Natural enemies include *Hydrotaea dentipes*, which is predaceous on the larvae; the adults are attacked by *Oxybelus* sp. and *Mellinus* sp., as well as parasitised by Chalcids. Parasites of the pupae include *Spalangia muscae* and a Pteromalid.

MÜLLER (J.). **Zur Naturgeschichte der Kleiderlaus.** [The Natural History of the Clothes Louse.]—*Das österr. Sanitätswesen*, *Vienna*, xxvii, 1915, Beilage to nos. 36–38, & 47–49, 75 pp., 34 figs., 4 plates. [Received 12th April 1920.]

This paper is chiefly intended for medical men studying the anatomy and biology of *Pediculus humanus* (*vestimenti*) in view of its rôle as a vector of typhus. Though mainly a compilation, it contains some original matter, given very briefly, as a complete monograph is to be published.

The anatomy, development, and biology of the louse are described. It was found that lice and their eggs are destroyed in 5–10 minutes by exposure to air heated to 90° C. (195°F.). Many physical and chemical agents cause apparent death. A louse that had been submerged under water for 22 hours showed no signs of movement under the microscope and its heart ceased beating; on removal from the water heart-action recommenced and the limbs subsequently began to move. This shows that a temporary sealing of the tracheae may lead to a suspension of heart-action, but not to death. A permanent seal however, such as is produced by grease and oil, proves fatal; this explains the efficacy of ointments and shows that the insecticide contained in them plays a subordinate rôle.

The second portion of this paper consists exclusively of notices of literature published during the printing of the first part.

WIDMAN (E.). **Beiträge zur Biologie der Kleiderlaus und deren Bekämpfung.** [Contributions to the Biology of the Clothes Louse and to its Control.]—*Zeitschr. f. Hygiene*, lxxx, 1915, p. 289. (Abstract in *Das österr. Sanitätswesen*, *Vienna*, xxvii, no. 36–38. 9th–23rd September 1915, p. 1216.) [Received 12th April 1920.]

Among other observations [*R.A.E.*, B, iv, 87] the author draws attention to the wave-like digestive movements of the gut of *Pediculus humanus* (*vestimenti*). These are important, as they make it possible to ascertain whether delousing measures have really killed the louse or have only stupefied it for a time. The author believes these movements to provide the most reliable indication available.

Prausnitz (W.). **Ueber Heissluftentlausung mit Fussbodenheizung.** [A System of Floor-heating in Delousing with Hot Air.]—*Das österr. Sanitätswesen, Vienna*, xxviii, no. 44–52, November-December 1916, pp. 1674–1698, 19 figs. [Received 12th April 1920.]

Although the researches of Koch and his school have proved steam to be superior to hot air as a delousing agent, the latter has advantages when large masses of material have to be dealt with without running the risk of damage. Furthermore the lice that carry typhus and their eggs are killed by exposure to air heated to 60–80° C. (140-178°F.).

It is most important that the chamber should be uniformly heated, and the method described here provides for the heat to be applied under the floor, while the favourable effect is still further enhanced by agitating the air within. The heating is accomplished by conducting the hot air from the furnace in metal tubes or brick channels beneath the floor. The air within the chamber is agitated by a hand or power-driven fan. Even untrained stokers can work this installation without danger to the articles that are being treated. If thoroughly dry, leather can withstand a temperature of 100° C. (212°F.), but wet leather is injured. By maintaining a temperature of 90–100° C.(195–212° F.) for 4 hours the bacilli of diptheria, cholera, typhus, etc., are destroyed.

This paper contains detailed plans of a chamber built on these lines, and suitable for erection in the open air. The outer walls should be hollow so as to conserve the heat. It is pointed out that if the doors and ventilator are previously provided two masons should be able to erect one in 2–3 days.

Hutchins (E.). **Annual Report of the Chief Veterinary Officer.**—*Uganda Dept. Agric. Ann. Rept. Year ended 31st March 1919, Entebbe*, 1920, pp. 33–36. [Received 8th April 1920.]

Extremely heavy losses from trypanosomiasis occurred among cattle inoculated against rinderpest; a large number of these were found to be infected with *Trypanosoma pecorum* and many died of the disease. Outbreaks also occurred in various districts, *Glossina fusca* being found in some of the localities concerned.

Doane (R.W.). **Mosquito Abatement in San Francisco Bay District.**—*Mthly. Bull. Cal. State Dept. Agric., Sacramento*, ix, no. 3, March 1920, pp. 81–82.

An account is given of measures adopted in Santa Clara County, California, by which mosquitos, which had been intolerably troublesome in the district for years, were almost entirely exterminated or reduced to negligible numbers. One side of the region is bounded by a salt-marsh swept during high tides by the waters of San Francisco Bay. The species found were *Aëdes squamiger* and *A. onondagensis* (*Ochlerotatus lativittatus*), as well as several fresh-water species such as *Theobaldia* (*Culiseta*) *incidens* and *Culex tarsalis*. Under a State law, a tax was levied throughout the district, and this enabled drainage operations to be carried out over about 3,000 acres. At the end of the first fiscal year, rather less than £1,000 had been spent in ditching and drainage, while mosquitos have practically disappeared from the region.

MORRIS (H.). **Some Carriers of Anthrax Infection.**—*Jl. Amer. Vet. Med. Assoc., Washington, D.C.*, lvi, no. 6, March 1920, pp. 606–608.

Much of the matter in this paper is quoted from one previously abstracted [*R A.E.*, B, vi, 181]. Experiments with the horn-fly [*Lyperosia*], the green-headed horse-fly [*Tabanus* sp.] and the swamp mosquito [*Aëdes sylvestris*] have shown that blood-sucking insects after feeding on the blood of an anthrax-infected animal are capable of transmitting the disease to healthy ones. The transmission seems to be mechanical, the infection being carried upon the proboscis of the insects. Non-biting flies too may be carriers. House-flies [*Musca domestica*] and blow-flies carry infection from anthrax-infected flesh by walking over a fresh surface wound in a healthy animal. Blow-flies bred from an unopened anthrax carcass did not carry infection in or on their bodies. This seems to be due to the destruction of anthrax bacilli in the carcass by the process of putrefaction. When however they were bred in the presence of anthrax spores, they carried infection both externally and internally. This proves the importance of keeping the natural openings of the carcass closed and the skin free from lesions, as anthrax spores do not form in the unopened carcass; once the spores are allowed to form, the process of decomposition has no effect on them.

The Argentine ant [*Iridomyrmex humilis*] leaves a trail of infection after feeding on an anthrax carcass.

PARKER (R. R.). **The present Status of the Control of** ***Dermacentor venustus*****, Banks, in the Bitter Root Valley, Mont., and the New Data concerning the Habits of the Tick.**—*Jl. Econ. Entom., Concord, N.H.* xiii, no 1, February 1920, pp. 31–37.

The control of the wood-tick, *Dermacentor venustus*, the chief transmitting agent of Rocky Mountain spotted fever is a difficult problem, although very considerable progress has been made in areas where work has been conducted. Two questions present themselves. One concerns the permanency of the results obtained, the other the possibility of finding some simpler and quicker method of operation. Lack of knowledge of the real source of the disease among wild mammals is a great handicap. If, for example, certain rodents were involved, measures directed against them would be much more certain of rapid and permanent results than those directed against the tick.

Under the present methods of tick control, *viz*:—rodent destruction; the restriction of grazing; dipping and hand-picking of stock; quarantine and cultivation—complete eradication will take five years or more, depending on the thoroughness with which the work is carried out. These measures must vary with local conditions, which differ from each other to a very great extent, and the difficulty of adapting the system of control to them is great. A method that would be of more general application is very desirable. Such a plan may be evolved by a study of disease among the wild animals, with the object of eradicating from any area those that permit the disease to perpetuate itself. Evidence already to hand indicates that such animals are few in number.

Some fresh observations on the habits of the ticks themselves show that their movements are not so limited as had been formerly supposed. Ticks that in spring occupy the dry slopes were found to have disappeared by June, when large numbers were found in the damper valleys. Experiments made with ticks marked with paint show that the majority tend to migrate down the slope. The conclusions finally reached are that ticks do move about, that the tendency on a slope is to move downwards, and that the migration is hindered when low vegetation is at all abundant.

Engorged immature ticks have a reaction to light. In darkness they do not drop from their host; by an increase in the light intensity, the rate of dropping can be increased, reaching its height in direct sunlight.

Liston (W.G.). **"The Next War": Man *versus* Insects.**—*Indian Jl. Med. Research, Calcutta*, Special Indian Science Congress Number, 1919, pp. 18–25. [Received 13th April 1920.]

Mankind is now trying to make up for the waste and destruction of the Great War, and is taking cognisance of its common foes. The war against disease requires careful preparation, and the importance of insects in it is now realised as never before. In India insects must take the first place among the enemies of man, for two-thirds of the preventable diseases can be attributed to their agency. The Medical Service needs organisation, co-operation and, above all, a leader. The sanitary, bacteriological and clinical departments should be more closely combined, and the leaders should not be those who rush into print most often and talk loudest. The publication of carefully prepared reviews is a great improvement in the methods of communication. Post-graduate schools are absolutely necessary, owing to the extent of the field and the rapidity of progress. Money is required; at present half the sum available for rural India has to be concentrated against smallpox alone. In twenty years more than ten million lives have been sacrificed to plague, an easily preventable disease, and the economic loss sustained can hardly be exaggerated.

Tirunarayana Iyengar (M. O.). **On the Results of a Mosquito-Survey of Indore City.**—*Indian Jl. Med. Research Calcutta*, Special Indian Science Congress Number, 1919, pp. 26–39, 4 plates. [Received 13th April 1920.]

The mosquitos found in Indore are:—*Anopheles subpictus* (*rossi*), *A. culicifacies*, *A. stephensi*, *A. fuliginosus* and *A. barbirostris* and several Culicines. The distribution of the larvae in the various sections of the two rivers and other waters is considered, some of the factors that govern their presence being the foulness or pureness of the water, the presence of aquatic plants that shelter the larvae and of algae on which they feed, the purification of contaminated water by vegetable organisms, and the presence or absence of larvicidal and other fish. Fresh or only slightly contaminated water is preferred by the most dangerous malaria mosquitos—*A. fuliginosus*, *A. stephensi* and *A. culicifacies.* At the same time attention is called to the fact that other mosquitos, such as *Anopheles subpictus* and *Culex* spp., though they do not transmit malaria, are able to transmit filariasis.

The methods of mosquito control suggested consist of :—clearing the rivers and water-courses of algae and water-weeds ; deepening shallows to discourage the growth of weeds, and stopping the flow of sullage into the river for the same reason ; the introduction of larvicidal fish of hardy local kinds, which also require pure water without sullage, and the extermination of predatory fish that attack them ; the encouragement of the keeping of ducks and geese, which eat up floating matter and probably mosquito larvae ; and the oiling of pools and drains that cannot otherwise be reached.

At the same time there should be a house-to-house treatment of malaria patients, with free distribution of quinine. Education of the children in the subject of mosquito control is probably the best way of reaching the people generally.

Sigler (T. A.). **Principal Parasites of Swine.**—*Amer. Jl. Vet. Med., Chicago*, xv, no. 4, April 1920, pp. 147–150.

The louse, *Haematopinus suis*, is the external parasite most frequently found on pigs [*R.A.E.*, B, vi, 170]. A common source of infestation is stock from infected herds, while filthy styes are prolific centres of infection. Pigs that are heavily infested are restless and do not feed well, while their sores open up new avenues for other infection. Their habits make it difficult to free a herd from lice, but they should be sprayed or dipped with kerosene emulsion, or in cold weather a powder composed of pyrethrum and naphthaline should be dusted on them and on their bedding. After treatment the pigs should be moved to fresh quarters, the pens and houses should be sprayed, and all litter burned.

Herms (W. B.). **Occurrence of Malaria and Anopheline Mosquitoes in Middle and Southern California.**—*U.S. Public Health Repts., Washington, D.C.*, xxxv, no. 6, 6th February 1920, pp. 275–281. [Received 13th April 1920.]

A summary is given of the work in the middle and southern portions of California during the State-wide malaria-mosquito survey. This part of the survey was made in 1917 and 1919, and has already been noticed [*R.A.E.*, B, vi, 70 and viii, 93].

Petrocchi (J.). **Anofelino trasmisor de Malaria encontrado en la Capital Federal.**—*Rev. Inst. Bact., Buenos Aires*, ii, no. 3, October 1919, pp. 295–302, 2 plates.

*Anopheles* (*Cellia*) *argyrotarsis*, R.D., a known malaria transmitter, has recently been captured in Buenos Aires. It is probable that this is the same species as that described by Arribálzaga in 1891 as *Anopheles albitarsis*.

The Anophelines at present known to occur in Argentina include *A. annulipalpis*, *A. pseudopunctipennis*, *A. argyrotarsis*, *A.* (*Cellia*) *albimanus*, *A.* (*C.*) *tarsimaculatus* and *A.* (*Arribalzagia*) *maculipes*.

Larrousse (F.). **Espèces européennes du Genre** *Phlebotomus*, **Rondani (Dipt., Psychodidae).**—*Bull. Soc. Entom. France, Paris*, 1920, no. 4, 25th February 1920, pp. 65–67.

The characteristics of the five European species of the genus *Phlebotomus*, Rond., recognised by the author are described. These are *P. papatasii*, Scop., *P. minutus*, Rond., *P. perniciosus*, Newst. (*legeri* Mans., *lusitanicus*, França), *P. mascittii*, Grassi, and *P. sergenti*, Parr. (*caucasicus*, Marz.). *P. perniciosus* var. *nigerrimus*, Newst., is recorded from Malta.

Bequaert (J.). *Rodhainomyia*, **Genre nouveau d'Oestride (Dipt.) Parasite de l'Eléphant.**—*Bull. Soc. Entom., France, Paris*, 1920, no. 4, 25th February 1920, pp. 67–69.

*Cobboldia chrysidiformis*, Beq., was described as a new parasite in the stomach of the African elephant in 1915 [*R.A.E.*, B, iv, 40], being placed in this genus in spite of the fact that it differs in certain particulars from the known forms of *Cobboldia*. It is now clear, however, that these points of difference amount to generic distinction, and a new genus, *Rodhainomyia*, is therefore erected for it. This fly lives in the larval stage in the stomach of the elephant, and is as yet only known in the Belgian Congo. *Cobboldia roverei*, Ged., is a synonym of *R. chrysidiformis*. *Cobboldia*, Brauer, is redescribed, the type being *C. elephantis*, Steel. The larva of this parasite develops in the stomach of the Asiatic elephant. Another species, *C. loxodontis*, Brauer, is parasitic on the African elephant; it occurs in the Upper Ivory Coast, the Gold Coast, Lake Chad, the Belgian Congo, and Uganda.

The author considers that the species named *C. parumspinosa* by Gedoelst [*R.A.E.*, B, vii, 116], is probably identical with *C. loxodontis*; this must remain doubtful until a further examination of the larvae can be made. It is very desirable that some further investigation should be made into the Dipterous parasites of the Asiatic elephant, about which very little is at present known.

Ferris (G. F.). **The First Stage Larva of** *Cuterebra americana*, **F. (Diptera; Oestridae).**—*Psyche, Boston, Mass.*, xxvii, no. 1, February 1920, pp. 13–14, 1 fig.

Very little information has been gathered concerning the first stage larvae of any species of Oestrid; a brief note is therefore published on the first stage of *Cuterebra americana*. A female of this fly was taken in flight in California on 8th October and confined in a glass jar. On the same day 100 to 150 eggs were deposited singly on the glass, to which they were very firmly attached. These began to hatch on 22nd October and all hatched normally, indicating that the stimulus of moisture, heat or friction is not essential to their development, as has been supposed. The first-stage larva is described.

Abrami (P.) & Senevet (G.). **A propos des Gamètes du** *Plasmodium praecox*. **Proportion variable des Eléments mâles et femelles.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 3, March 1920, pp. 167–172.

After examining a great number of gametes from a case of malaria due to *Plasmodium praecox*, and allowing for a certain margin of error, the results indicate that the male gametes disappear more rapidly from the blood than the female ones. This would explain the different views of authors who have studied the question of the sex of gametes and whose examinations have been made during various phases of the illness.

VÉLU (H.). **Comment il convient d'organiser la Lutte contre la Gale des Animaux domestiques aux Colonies.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 3, March 1920, pp. 186–191.

It has been remarked that in spite of a vast field of experimentation, the War has ended without any simple and practical treatment for mange having been decided upon. It is admitted that baths, whether liquid or vapour, have the great advantage of reaching every part of the skin, but the most suitable formulae for preparing such baths have given rise to much discussion. None of the numerous papers published in the professional journals has suggested any simple process which, being less expensive than the installation of sulphur chambers or swimming dips, and requiring no great technical knowledge or supervision, would be suitable for use on isolated farms in the Colonies or in small military stations rarely visited by a veterinary officer.

The Cooper dip, having been used with much success on pigs suffering from mange, which were cured after four treatments at seven days' interval, was tried for horses in Morocco with equally good results. An epizootic having broken out after the arrival of infected horses and mules from France, 150 cases were sent to the infirmary. A small bath was constructed in 24 hours by raising a cement wall 8 inches high in front of one of the stables, for which 200 litres (44 gals.) of 15 per cent. solution was prepared from the instructions issued with this dip. The horses were taken into this bath and sprayed with a pump provided with a long tube and a Vermorel jet, working first over one side of the animal beginning near the head and taking care that the liquid penetrated into every fold of the skin, inside the ear, etc., and then over the other side. For slightly infested and non-clipped animals it is best to swab them over after the first treatment to ensure penetration of the liquid and then spray them again for a few seconds. The liquid can be used repeatedly by filtering through gauze and should be renewed by the addition of 20 gallons of freshly prepared solution each morning. In this manner 25 horses per day were easily treated, and spraying was repeated once each week for 3 or 4 weeks. This method is a simple one and obviates the inconveniences of the usual parasiticide baths, such as variations in concentration, decomposition, etc. While Cooper's dip has given every satisfaction, it would be interesting to try some of the simple formulae used against the parasites of cattle (ticks, lice, mites, etc.), such as the Watkins-Pitchford arsenical solution, or Chapin's sulphur solution, the preparation of which is described.

LEGER (M.). **La Guyane française : Questions de Salubrité et de Réglementations sanitaires.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 3, March 1920, pp. 199–204.

French Guiana has always had a bad reputation for unhealthiness, especially for Europeans, and the opinion is commonly current that there are no sanitation measures in the Colony. This, however, is not so; cholera, plague and yellow fever have disappeared for many years, and while leprosy is a serious menace, it is apparently no more so than in other French Oceanic or African Colonies. Malaria, which is endemic, continues to be the chief scourge, but anti-malarial measures have reduced its incidence to a level below that of most of the French possessions in Africa and Madagascar. While the necessary regulations exist, it is undoubtedly rather difficult to apply them, largely owing to the poverty of the country and the sparse population. It is hoped that, with improvements in these directions, French Guiana will before long become one of the most prosperous French colonies.

LEDINGHAM (J. C. G.). **Dysentery and Enteric Disease in Mesopotamia from the Laboratory Standpoint.**—*Jl. R.A.M.C., London*, xxxiv, no. 4, April 1920, pp. 306-320.

In the course of this paper the following observations are made on fly prevalence, and dysentery. In Mesopotamia there are two seasons of fly prevalence, which correspond fairly closely in time with the spring and autumn dysentery seasons. The greatest number of flies occurs at the end of April and the beginning of May and again in November. But the almost complete disappearance of flies in the hot months is not accompanied by a proportionate fall in the dysentery prevalence. Certain factors other than flies must therefore play the more important rôle in distributing infection during this period. The author suggests that the mass of fresh infections established in the spring outbreak, largely by the agency of flies, leaves behind it an amount of chronic and carrier infection which, aided by weather conditions favouring intestinal disturbance, serves to maintain the incidence of dysentery and diarrhoea at a fairly constant level till the next fly outburst initiates the autumnal mass of fresh infections.

MACGREGOR (M. E.). **The Possible Use of *Azolla filiculoides* as a Deterrent to Anopheline Breeding.**—*Jl. R.A.M.C., London*, xxxiv, no. 4, April 1920, pp. 370-372, 1 fig.

*Azolla filiculoides* is a water-weed of the fern family recently introduced into England from Canada. It spreads very rapidly, completely covering the surface of the water in which it grows with a spongy mass of compact leaves. Anopheline mosquitos must have an open water surface on which to lay their eggs, and it was observed that they did not oviposit in the experimental breeding tank which was covered by *A. filiculoides*, though they oviposited freely in the other tanks that contained other kinds of weeds. It was too late in the season for experiments in natural ponds, but no Anopheline larvae were found in the one pond near Sandwich from which the weed was obtained.

AUSTEN (Major E. E.). **A Contribution to Knowledge of the Tabanidae of Palestine.**—*Bull. Entom. Research, London*, x, no. 3, April 1920, pp. 277-321, 18 figs.

This paper deals with material collected by the author in Palestine during the campaign against the Turks. There was a rumour in 1917 that the Turks in the Jordan Valley lost a large number of camels from surra, a form of trypanosomiasis of which the causative agent, *Trypanosoma evansi*, is believed to be capable of dissemination by more than one species of *Tabanus*. The Egyptian Expeditionary Force stationed there in 1918, however, had but few cases of surra among their camels, and these were by no means certainly contracted in Palestine.

No species of *Pangonia* was taken, but 16 species of *Tabanus* were collected, of which nearly half are new. Attention is directed to the pursuit of a fast travelling motor car by two species. This habit does not seem to have been previously recorded, though in Africa the attraction for *Glossina* of moving vehicles or animals has been noticed on more than one occasion. The chase is, however, confined to short distances, so that the establishment of a motor route through a local Tabanid area would not be likely to have much effect on distribution.

The species dealt with include *Chrysops punctifera*, Lw., which is apparently the only representative of its genus in Palestine; *Haematopota sewelli*, sp. n., *H. minuscularia*, sp. n., *H. minuscula*, sp. n., and *H. innominata*, sp. n., to which a key is given; *Tabanus decorus*, Lw., *T. alexandrinus*, Wied., *T. insecutor*, sp. n., *T. gigas*, Hbst., *T. mendicus*, Villen., *T. lunatus*, F., *T. nemoralis*, Mg., *T. eggeri*, Schin., *T. autumnalis*, L., *T. regularis*, Jaenn., *T. rupinae*, sp. n., *T. arenivagus*, sp. n. *T. accensus*, sp. n., *T. leleani*, sp. n., *T. pallidipes*, sp. n., and *T. dalei*, sp. n., a key being given to these.

Barraud (P. J.). **Notes on some Culicidae collected in Lower Mesopotamia.**—*Bull. Entom. Research, London*, x. no. 3, April 1920, pp. 323–325.

The mosquitos dealt with in this paper were collected in the neighbourhood of Basrah, Lower Mesopotamia, between October 1918 and February 1919, mostly in the cultivated belt lying between the river banks and the desert; this area is intersected by numerous creeks and irrigation canals and also contains many pools and swampy areas.

*Anopheles stephensi*, List., appears to be the chief malaria carrier of the district, numbers of larvae and adults being found from October to December, the larvae occurring chiefly in the clearer pools of the cultivated area. *A. pulcherrimus*, Theo., seems to have been much reduced in numbers by anti-malarial work, but many larvae were found in pools near the edge of the desert in October. These sometimes occur with *A. stephensi*, but generally prefer weed-grown, stagnant and more brackish water. *A. hyrcanus*, Pall. (*sinensis*, Wied.), is not often seen in the Basrah area, but a few were caught in the marshes beside the river.

*Culex fatigans*, Wied., was abundant in pools; *C. pipiens* was less frequent and was not seen before January; *C. modestus*, Fic., *C. tritaeniorhynchus*, Giles, and *C. tipuliformis*, Theo., were found in small numbers. *Stegomyia fasciata*, F., was seldom seen and no larvae were found; *Ochlerotatus dorsalis*, Mg., was common, both in the cultivated area and on the edge of the desert, adults and larvae occurring from December to February. *Theobaldia longiareolata*, Macq., was frequently found in the larval state in January and February, chiefly in the deeper pools; the pupa usually remains about

4 inches below the surface of the water, maintaining its position by a gentle movement. *T. annulata*, Schr., was fairly common after 24th February.

MANSFIELD-ADERS (W.). **Notes on the Identification of Anophelinae and their Larvae in the Zanzibar Protectorate.**—*Bull. Entom. Research, London,* x, no. 3, April 1920, pp. 329–332. 1 fig.

Of the four Anophelines that have been found in the Zanzibar Protectorate two are well-known malaria carriers. These are *Anopheles costalis*, Lw., and *A. funestus*, Giles, the others being, *A. mauritianus*, Grp., and *A. squamosus*, Theo. A brief description is given of the adults by which each may be easily recognised. The identification of the larvae is more difficult. Those of *A. costalis* are generally found in small collections of rain-water, shallow swamps surrounded by grass and in cement tanks, especially those with a growth of algae at the sides. Larvae of *A. funestus* usually occur in backwaters of streams and at the edge of sluggish rivers overhung by vegetation. They are often found with *A. costalis*, but may be distinguished from any other species by a pair of thick feathered hairs springing from a chitinous pocket near the middle of the thorax. *A. mauritianus* is identifiable by a conspicuous hair-tuft in the median region of the antennae, and by two fan-shaped tufts of short black hairs above the mouth-brushes. The larvae have a peculiar and characteristic habit of twisting themselves into an S-shape.

PILLERS (A. W. N.). ***Glycyphagus domesticus*, De Geer, an accidental Parasite in the Ear of the domesticated Rabbit.**—*Vet. Jl., London,* lxxvi, no. 4, April 1920, pp. 126–128, 4 figs.

A case is recorded of the Tyroglyphid mite, *Glycyphagus domesticus*, being found in the ear of a domestic rabbit. The species in question is a grain pest, resembling *G. spinipes*, but being much less common; neither of these mites is usually parasitic. *G. domesticus* is said to be commonly found in houses on all kinds of dried animal and vegetable matter and has also been known to occur in rush furniture, cork and even tobacco; it has occasionally been recorded upon man and animals.

NEVERMANN (—) & WILHELMI (—.). **Zur Bekämpfung der Kriebelmückenplage.** [Measures against *Simulium*.]—*Deutsche Tierärztl. Wochenschr., Hanover,* xxviii, no. 12–13, 27th March 1920, pp. 133–138.

This article indicates the various points concerning the SIMULIIDAE on which further knowledge is required. About 400 references on the subject were consulted. The methods that have been advocated against these pests are mentioned. Those recommended are the regulation of pasturing, the protection of animals with repellents, and the removal of vegetation from small streams in March and in the autumn.

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Turner (R. E.). **On a new Mutillid Parasite of** *Glossina morsitans*.—*Bull. Entom. Research, London*, x, no. 3, April 1920, pp. 327–328, 1 fig.

*Mutilla auxiliaris*, sp. n., which is described, was bred from puparia of *Glossina morsitans* in Portuguese East Africa, and is closely related to *M. glossinae*, Turn. [*R.A.E.*, B., iii, 118].

Stanton (A. T.). **The Mosquitos of Far Eastern Ports with special reference to the Prevalence of** *Stegomyia fasciata*, **F.**—*Bull. Entom. Research, London*, x, no. 3, April 1920, pp. 333–344.

The danger of the introduction of yellow fever into Oriental countries has long been discussed, more particularly since the opening of the Panama Canal. In September 1915 an investigation was begun regarding the prevalence of *Stegomyia fasciata*, the known carrier of the disease, in Far Eastern ports. This paper includes reports of visits made between October 1915 and March 1916 to Bangkok (Siam), Saigon (Cochin-China), Haiphong (Tonkin), Canton (South China). Batavia, Samarang and Soerabaia (Java), Makasser (Celebes) and Tjilatjap (Java), with lists of the mosquitos found at each port.

Other records of the occurrence of *Stegomyia* spp. from different parts of the Malay Peninsula and neighbouring countries are also given. On many ships examined both in port and at sea, some of them coming from heavily infested ports, *S. fasciata* was observed only once, and then in a ship on a river on both banks of which the species was breeding in large numbers. It is often stated that in the East *S. fasciata* is found on land only near the sea coast; it is therefore noteworthy that it was found in Java 40 miles from the sea and 2,300 feet above sea-level, and is common in Kuala Lumpur, 27 miles from the sea.

*S. fasciata* was found to be prevalent in the Far Eastern ports at all seasons of the year. Even where efforts have been made to reduce its numbers it is common; where no such work has been undertaken, it constitutes a plague. Conditions are therefore highly favourable to the spread of yellow fever if it should be introduced. The old trade routes, however, between America and the East have not been altered since the opening of the Panama Canal, and still pass northward by way of Honolulu, Japan and China. It was found that in ports situated towards the northerly limit of the Eastern tropical belt, *S. fasciata* occurred in relatively small numbers in the colder months, or was not observed at all. It is thought probable that conditions in the ports of China and Japan would prove unfavourable to the propagation of this mosquito even in the warmer months. If so, the path for conveyance of yellow fever to the Orient would be cut at that point. A survey of these ports is therefore of great importance to complete the present observations. With the increase of sea-borne traffic it is essential that the reduction of *S. fasciata* in Far Eastern ports should be vigorously undertaken. The results in Colombo have shown what can be done in this direction. It is suggested that trained entomologists should be engaged entirely for the study of problems connected with mosquito reduction and for supervision of suppressive measures. These officers should work in close co-operation with the executive public health authorities.

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KIRK (H.). **Treatment of Mange and Lice.**—*Vet. Jl., London*, lxxvi no. 4, April 1920, pp. 122–126.

The author considers that the calcium sulphide dip, which was largely used in France for mange, is effective, but is too slow in action to be really economical, although it is inexpensive compared with oily dressings. Experiments that were carried out with a certain proprietary arsenical dip are recorded and gave disappointing results. A dressing that the author has found very effective is made of horse fat to which has been added sodium bicarbonate boiled in water for two hours. It is then skimmed off and the process repeated in fresh water. After again skimming off, 1 part of sublimed sulphur is added to 6 parts of fat and about 2 oz. boric acid per 5 gals. is added as a preservative. Any fat or oil that is applied rancid or impure, or becomes rancid while on the animal, will cause blistering of the skin. This dressing is applied at blood heat with a cloth from the tips of the ears to the coronets and then scrubbed in with a dandy brush. On the following day the horse should be thoroughly hand-rubbed, and on the third day should be washed and scrubbed with hot water and soap. If one dressing does not effect a cure a second and perhaps a third may be given, though this is seldom necessary. The dressing should not be left on too long, nor should the animal be exposed to the sun during the process. This dressing is also toxic to lice and has a decided effect on the nits, more so than an arsenical dip.

Fumigation with $SO_2$ is advocated in the French Army as a reliable method against lice, but the author has had disappointing results with it. In his opinion the best treatments for lice, in the order named, are horse fat and sulphur dressing, singeing, followed by washing with Jeyes' fluid, and sponging with a 33 per cent. solution of glacial acetic acid. All these methods directly affect the eggs as well as killing the lice, but they must be preceded by clipping.

RICHTER (—), HEIDENREICH (—) & RAEBIGER (—). **Das Auftreten der Kriebelmücken in Anhalt und die zu ihrer Bekämpfung getroffenen Massnahmen.** [The Occurrence of Simuliids in Anhalt and the Measures taken against them.]—*Deutsche Tierärztl. Wochenschr., Hanover*, xxviii, no. 17, 24th April 1920, pp. 189–192.

Mortality among live-stock due to bites of *Simulium* has been recorded from Germany and Hungary during the past 15 years [*R.A.E.*, B, iv, 126 ; v, 17]. Several cases from Anhalt in 1917 are described here ; the pathological and anatomical changes differ in various points from those observed previously. Contrary to what was noted in Hanover a comparatively large number of horses succumbed. The causal agent of death has not yet been discovered.

As swarms of Simuliids were expected to appear in April and May 1918 the desirability of discovering their breeding places was evident and a committee was appointed by the Anhalt Government to do this and to take the necessary measures. Investigations showed that *Simulium argyreatum* (which caused the losses in 1917), *S. maculatum*, *S. reptans* and a fourth, undetermined species were present. On one stream it was found that a portion that was dammed was uninfested.

Apparently the lack of undercurrent and the smaller amount of oxygen in the dammed water are unfavourable to the flies. Furthermore the larvae pupate on water-plants, and if the water-level falls the adults emerge; if this emergence takes place in spring when animals at pasture have not been immunised by occasional bites, then fatal cases occur. To prevent the emergence of large swarms it is necesssary to observe the development of the larvae and the height of the water, and the latter must be dammed at the proper time. In the case of small brooks or drains recourse may be had to flooding; the larvae will migrate to the submerged grass and a sudden fall of the water will leave them to perish. These methods are advocated in conjunction with preventive measures consisting in regulating the times when animals are put out to graze. The latter measures proved very successful in Anhalt, no deaths occurring in 1918 and 1919 in spite of large swarms of *Simulium* being observed.

López Neyra (C. R.) & Muñoz Medina (J. M.). **Estudio del Ciclo evolutivo seguido por algunas Especies correspondientes al Género** *Dipylidium*, **Leuckart.** [Study on the Development of certain Species of the Genus *Dipylidium*, Leuckart.]—*Bol. R. Soc. Esp. Historia Natural, Madrid*, xix, no. 9–10, November-December, 1919, pp. 494–506, 2 plates.

Experimental studies are described on various species of *Dipylidium*, more particularly *D. caninum*, L., an internal parasite of the dog and domestic cat, and, accidentally, of man. It is known that the intermediary hosts and transmitters that harbour the cisticercoid stage of *D. caninum* are, accidentally, the louse of the dog, *Trichodectes canis*, Retz, and preferably, the dog-flea, *Ctenocephalus canis*, Curtis, and the human flea, *Pulex irritans*, L. It has been demonstrated that the larval stage of the parasite develops normally in these hosts, and owing to the small size of the lumen of the proboscis in the flea, which would prevent the insects from ingesting the large eggs of *D. caninum*, it is admitted that they must become affected in their larval stage, when their mouth-parts are comparatively large. This hypothesis has been proved by the failure to infect adult fleas by feeding them upon dogs infested with eggs of *D. caninum*, and by the success of infecting flea larvae under the same conditions. The eggs in this case are easily ingested and pass to the intestines, where the embryos remain free, and penetrating into the general cavity, become localised for preference in the last larval segments. Here they remain without development until the fleas become adult. Two or three days later, the embryo begins to develop.

Francis (E.). **Filariasis in Southern United States.**—*U.S. Pub. Health Service, Washington, D.C.*, Hyg. Lab. Bull. 117, June 1919, 36 pp., 10 plates. [Received 6th April 1920.]

Filariasis of man, a mosquito-borne disease, is characterised by the presence in the blood of microscopic slender microfilariae that are the offspring of adult female worms permanently located in some tissue of the body. In the case of *Filaria bancrofti*, by far the most widespread species infesting man, the parent worms are located in the lymphatics and lymph glands. Disease is caused by the blocking of lymph by the adult, or by immature ova, not by microfilariae in the blood. The organisms multiply by sexual reproduction in the lymphatic system only ; the embryos, escaping into the blood as microfilariae, circulate, awaiting the opportunity of being imbibed by a biting mosquito. The mosquito draws them into its stomach with the blood. The microfilariae, after losing their sheaths, pierce the stomach wall, and undergo metamorphosis in the thoracic muscles. In about two weeks they migrate to the proboscis, in order to get back into man when the mosquito again feeds. They then pass by way of the lymphatics to the nearest lymph gland, where they grow to maturity.

If filariasis is compared with malaria, it will be seen that transmission of the former is relatively difficult. The microfilariae do not multiply in the body of the mosquito ; very few are imbibed by it, fewer still survive the stages in the mosquito and finally reach the proboscis. They are not injected by the mosquito bite, but are only dropped on the skin of man, so that the number that penetrate it and reach a lymphatic gland is smaller still. Even then, unless a male and a female find lodgement in the same lymph gland, reproduction cannot take place. Besides this a mosquito will probably become infected only if it bites during the few hours of the night when the microfilariae are active in the blood, and the bite of the infected mosquito can only cause infection after two weeks and when the organism is actually in its proboscis. Consequently filariasis cannot spread except in a locality where there is mass blood infection and mass mosquito biting. In the United States these conditions only occur in Charlestown.

In Charlestown over 90 per cent. of the mosquitos are *Culex fatigans* and dissections have shown them to be active carriers of *Filaria bancrofti*. Another 9 per cent. are *Stegomyia fasciata* (*Aëdes calopus*), none of which carried the infection.

As no drug is known that will eradicate microfilariae from the blood stream, the disease must be attacked through the mosquito. A municipal, piped water supply, coupled with an ordinance requiring the destruction of all collections of water in which mosquitos might breed, would rid a community of filariasis by reducing the numbers of *Culex fatigans* to a negligible degree.

In part iv of this paper is described the anatomy of the mosquito proboscis in relation to filaria transmission, showing how on the inward course the parasites pass with the blood through the proboscis itself, while on the outward journey they travel by way of the proboscis sheath and fall on to the intact skin clear of the wound the proboscis has made.

**Malariabekämpfung, Anophelenkarte für Deutschösterreich.** [Anti-Malaria Work, Anopheline Chart for German Austria.]—*Mitt. Volksgesundheitsamtes, Vienna*, no. 1, 11th April 1919, pp. 1–2. [Received 12th April 1920.]

A decree, dated 25th March 1919, of the National Health Department of the Ministry for Social Administration refers to a previous decree (13th January 1919) providing for the preparation of an Anopheline Chart for German Austria and orders the local sanitary authorities to enlist the help of zoologists in compiling this.

Stempell (W.). **Notiz über die Parasiten der Fleckfieberläuse.** [A Note on the Parasites of Lice causing Recurrent Fever.]—*Mitt. Zool. Inst. der Westfälischen Wilhelms-Universität, Munster i. W.*, no. 1, 20th November 1918, p. 6. [Received 12th April 1920.]

With reference to his record of a new parasite, *Strickeria jürgensi*, gen. et sp. n. [*R.A.E.*, B, v, p. 111] of the clothes louse [*Pediculus humanus*], the author points out that Kuczynski has infected lice with *Bacterium proteus* X19 [*R.A.E.*, B, vii, 68] and obtained forms very similar to *Strickeria*, though this resemblance escaped his attention.

Koch (A.). **Zur Atmungs-Physiologie der Larven von** ***Culex pipiens*****, L.** [The Physiology of Respiration of the Larvae of *C. pipiens*.]—*Mitt. Zool. Inst. der Westfalischen Wilhelms-Universität, Munster i. W.*, no. 1, 20th November 1918, pp. 6–8. [Received 12th April 1920.]

This article repeats the information published by the author elsewhere. [*R.A.E.*, B, vii, 49.]

Gofferje (M.) **Die Wirkung verschiedener Salze auf Larven von** ***Culex pipiens*****, L.** [The effect of various Salts on the Larvae of *C. pipiens*.]—*Mitt. Zool. Inst. der Westfälischen Wilhelms-Universität, Munster i. W.*, no. 1, 20th November 1918, pp. 9–11. [Received 12th April 1920.]

After it had been found that in larvae of *Culex pipiens* the method of elimination of carbonic acid (through the surface of the body or through the tracheal system) is not influenced by the gas content of the water, investigation was directed to ascertain the mechanism of the gas interchange and the influence on the working of the tracheae of the variation of the salt content in the medium. Before undertaking submersion experiments with solutions containing salts it was however necessary to make comprehensive tests on the life and development of the larvae in solutions containing various salts at different strengths.

The breeding media to which the larvae were transferred were normal solutions of the chlorides, nitrates and sulphates of sodium, potassium, calcium and magnesium. The average length of life of the larvae was taken as a basis, and observations relating to moulting, pupation and the emergence of adults were taken into account. It was thus possible to divide the solutions into "fatal" (causing death within 24 hours), "development checking" and "non-active." In the following list solutions of normal strength are taken as a basis and the dilutions mentioned are dilutions of the normal solutions. The first group includes all the solutions at half strength and the quarter strength solutions of the nitrates and of the chlorides of potassium and magnesium. Except in the case of potassium nitrate all the salts at a strength of $\frac{1}{32}$ or $\frac{1}{64}$ were non-active; common salt (sodium chloride) was inactive at $\frac{1}{16}$ strength. Development was checked by the chlorides and sulphates of sodium and potassium. In sodium chloride solutions of $\frac{1}{32}$ and $\frac{1}{64}$ strength a larva was observed to live 70 days ; in a $\frac{1}{32}$ solution of potassium chloride a period of 57 days was observed ; in a $\frac{1}{64}$ solution of sodium sulphate, 37 days ; and in a $\frac{1}{32}$ solution of potassium sulphate, 38 days on an average.

Within certain limits the effect of the salts varies according to the stages of the larvae, decreasing in the mature ones. The nitrates of sodium and potassium, which are the most injurious, exercise a stronger action on the two middle stages than on the last one. Magnesium salts do not appear to follow any rule. The other salts, if in strong solutions, act like the above nitrates ; in weak solutions their injurious effect decreases and the smaller larvae are then better able to adapt themselves than the larger ones.

If the larvae were kept in a mixture of such solutions as had yielded about the same average length of life, there never occurred a reduction of the length of life, but—on the contrary—a marked increase was observed in some cases, such as given by a mixture of equal parts of sodium chloride $\frac{1}{8}$ solution and potassium chloride $\frac{1}{16}$. The development of the pupae and adults was not favoured to the same degree. In the presence of the salts used Chironomid larvae can stand a 4–5 times increase of the salt content.

If larvae "prepared" in a given salt solution are submerged in another, stronger solution of the same salt, they may be able to adapt themselves, provided the solution is not one of the "fatal" group.

The chief result of these experiments is that submersion (or even "preparation") in a solution from the "fatal" group causes an accumulation of carbonic acid in the main tracheae, with, perhaps, the production of gas bubbles through the stigmata.

These results seem to lead to the following conception of the mechanism of gas interchange in Culicid larvae :—Under normal conditions the tracheae obtain sufficient oxygen through the stigmata and the surface of the body eliminates most of the carbonic acid resulting from the changes in the cell-tissues. But it may be assumed that—even normally—there exists a capacity (if only a limited one) to absorb oxygen through the skin and eliminate carbonic acid through the tracheae. This reversed process may attain great importance under abnormal conditions, such as cases in which the physiological equilibrium of the organism is affected by acute disturbances or by those due to development.

The collection of $CO_2$ in the tracheae and the discharge of gas bubbles through the stigmata can therefore scarcely be looked upon as a sign of general degeneration of the larva ; it is not a pathological character but a response to certain conditions.

Koch (A.). **Zur Physiologie des Tracheensystems der Larven von** *Mochlonyx* **(Lw.).**—*Mitt. Zool. Inst. der Westfälischen Wilhelms-Universität, Munster i. W.*, no. 1, 20th November 1918, pp. 11–13. [Received 12th April 1920.]

The results obtained with *Culex* larvae [see preceding paper] have led to experiments with other mosquitos and it was found that the larvae of *Mochlonyx* possess to even a greater degree than those of *Culex* the ability to absorb oxygen through the surface of the body and to eliminate carbonic acid through the tracheal system. This is easily explained by the biology of these species.

SHIRAKI (T.). **Blood-Sucking Insects of Formosa. Part. 1. Tabanidae (with Japanese Species).**—*Agric. Expt. Sta., Taihoku*, 1918, 442 pp., 11 plates. [Received 15th April 1920.]

Most of the blood-sucking insects found in Formosa belong to the same families as those found in the Palaearctic and Oriental regions, but some of them, such as the new Tabanid genus *Isshikia* may be peculiar to the Island. In this work the Tabanids only are dealt with.

These flies, owing to their large size, are the most formidable in appearance of the blood-sucking insects of the Islands. They may be met with throughout the summer in fields, open spaces and sometimes in the open rooms of Japanese houses. Practically nothing is known of their life-histories in Formosa, but as in other countries, they are preyed upon by Asilids. A female of *Microstylum oberthuri*, Wulp, for example, has been observed in Formosa feeding upon *Chrysops sinensis*, and similar species prey upon other species of *Chrysops* and *Atylotus*, but the males only are attacked and there is no record of the females being devoured by Asilid flies. There are, as yet, no Hymenopterous parasites of the eggs of Tabanids known in the Islands.

A list of 60 species of Tabanids known to Formosa is given, with descriptions of each. New species recorded are *Corizoneura yezoensis* *Chrysops basalis*, *Haematopota sakhalinensis*, *H. formosana*, *Tabanus kotoshoensis*, *T. arisanus*, *T. sapporoensis*, *T. iyoensis*, *T. fulvimedioides* *T. okinawanus*, *T. sapporoenus* and *T. takasagoensis*. *T. coquilletti*, n. n., is proposed for *T. tenebrosus*, Coq. (nec Walker).

A new genus, *Isshikia*, is erected for *Dichelacera japonica*, Big. A key to the Japanese genera is given.

HASE (A.). **Ein Beitrag zur Fliegenplage.** [A Note on the Fly Plague.]—*Zeitschr. f. angew. Entom., Berlin*, iii, no. 1, 1916, pp. 117–123, 1 fig. [Received 19th April 1920.]

During the campaign on the eastern front from June to August 1915 the following species were found to be abundant: *Musca domestica*, L., *Fannia* (*Homalomyia*) *canicularis*, L., (*H.*) *scalaris*, F., *Sarcophaga carnaria*, L., *Calliphora erythrocephala*, Meig., *C. vomitoria*, L., *Muscina stabulans*, Fall., *Lucilia caesar*, L., and *Eristalis*.

The flies were most abundant in the small villages of Poland where only the most primitive sanitary conditions exist. In many cases the stables form part of the dwelling house, and owing to the lack of drainage all refuse including animal and human excreta is thrown into the open field. All liquid refuse was usually poured into the gutter, which emptied itself into a shallow basin at the end of the village, thus forming an evil smelling stagnant pool. Under these conditions the usual remedial measures such as fly-traps, etc., were practically useless, as the only possible means of reducing the pest would be the destruction of the enormous breeding area. Where possible large trenches were dug and the refuse well covered with soil, but as the extent of this work was very limited, very little benefit was thereby obtained. The necessity for the organisation of systematic control measures including thorough sanitation of the villages in the district under consideration is emphasised. Temporary relief was obtained by the use of mosquito nets and traps consisting of shallow saucers containing beer and arsenic.

HAECKER (V.). **Zur Fliegenplage in Wohnungen und Lazaretten.** [The Fly Pest in Dwellings and Hospitals.]—*Zeitschr. f. angew. Entom., Berlin*, iii, no. 2, 1916, pp. 207–209. [Received 19th April 1920.]

Observations made by the author show that flies may be kept out of dwellings and hospitals even when conditions are such that all breeding places outside the buildings cannot be entirely destroyed. The habit of flies in general of congregating on sunny walls of dwellings is taken into consideration and by shutting all windows just before the sun reached them and keeping them shut until they were again in the shade the author was able to exclude these pests entirely from the interior of his house and the same method has since proved successful under hospital conditions.

ESCHERICH (K.). **Blausäure als Entlausungsmittel.** [Hydrocyanic Acid as a remedial Measure against Lice.]—*Zeitschr. f. angew. Entom., Berlin*, iii, no. 3, 1916, pp. 426–428, 1 fig. [Received 19th April 1920.]

The advantages of hydrocyanic acid gas fumigation over other insecticides for the destruction of lice and other insect pests are emphasised, and the method of utilisation is described.

MARTINI (E.). **Zur Kenntnis des Verhaltens der Läuse gegenüber Wärme.** [A Contribution to the Knowledge of the Behaviour of Lice with Reference to Heat.]—*Zeitschr. f. angew. Entom., Berlin*, iv, no. 1, 1918, pp. 34–70, 10 figs. [Received 19th April 1920.]

In extensive experiments here described, it was found that if lice were placed on an unequally warmed surface the individuals wandered about aimlessly until accidently a point of suitable temperature was reached. Radiant heat has a distinct attraction for these insects and they will follow the rays. Between 27–30° C. (80–85°F.) is apparently the temperature preferred by them, as they migrate from a cooler or warmer environment towards this centre.

HASE (A.). **Über die Bekämpfung der Bettwanzen** (*Cimex lectularius*, **L.**) **mittel Cyanwasserstoff** (**Blausäure**). [Control of Bed-bugs by means of Hydrocyanic Acid].—*Zeitschr. f. angew. Entom., Berlin*, iv, no. 2, 1918, pp. 297–309, 4 figs. [Received 19th April 1920.]

Successful experiments with hydrocyanic acid fumigation against *Cimex lectularius*, L., in inhabited houses are described in detail.

BRESSLAU (E.) & GLASER (F.). **Die Sommerbekämpfung der Stechmücken.** [Summer Control of Mosquitos.]—*Zeitschr. f. angew. Entom., Berlin*, iv, no. 2, 1918, pp. 290–296, 2 figs.

——. **Die Winterbekämpfung der Stechmücken.** [Winter Control of Mosquitos].—*Ibid*, pp. 327–331. [Received 19th April 1920.]

Mosquito control is divided for convenience into measures for summer and winter. The summer measures, which aim at the destruction of mosquito larvae, includes the removal of useless collections of water that may prove suitable breeding places, the destruction of existing breeding places and measures to prevent oviposition in waters that cannot be removed.

The work carried out on these lines during the campaign in Alsace is described. Owing to the abundance of *Anopheles maculipennis* and *A. bifurcatus* in certain districts it was found necessary to include destruction of the adults in the summer. This was effected by spraying with "Floria-Insektizid," a substance that had proved most effective in the winter control. During July a 10 per cent. solution was used, but in the previous and following months 5 per cent. should prove sufficient.

In the second paper spraying is compared with the use of hydrocyanic acid gas. Although the latter has proved most valuable in dealing with many other pests, the author emphasises the advantages of spraying in dealing with mosquitos. During the winter a 3 per cent. solution only is required to kill the adults. All methods to be effective should be systematically organised and carried out by the whole community.

TEICHMANN (E.). **Die Bekämpfung der Fliegenplage.** [The Control of the Fly Pest.]—*Zeitschr. f. angew. Entom., Berlin*, iv, no. 3, 1918, pp. 347–365.

Experiments made with *Musca domestica*, *Fannia* (*Homalomyia*) *canicularis* and *Stomoxys calcitrans* show that these flies can be destroyed by exposure for 30 minutes to 1 volume per thousand of hydrocyanic acid gas (1·2096 grm. HCN per cu. metre) or for 15 minutes to 2½ volumes per thousand (=3·024 grms. HCN per cu. metre). The early stages may be destroyed by the application of a solution of sodium cyanide at the strength of 0·1 per cent. for the eggs and 0·25 per cent. for the larvae and pupae.

PRELL (H.). **Das Entstehen von Schnakenplagen.** [The Origin of Mosquito Plagues.]—*Zeitschr. f. angew. Entom., Berlin*, v, no. 1, 1919, pp. 61–66. [Received 19th April 1920.]

As the occurrence has been observed of large numbers of certain mosquitos such as *Culex pipiens* and *C. hortensis* (*territans*) without man being attacked by them, it is suggested in explanation that a change has taken place in their habits, though this theory requires further proof.

TEICHMANN (E.). **Blausäure-Verfahren und Winterbekämpfung der Stechmücken.** [Hydrocyanic Acid Methods and Winter Control of Mosquitos.]—*Zeitschr. f. angew. Entom., Berlin*, v, no. 1, 1919, 118–125. [Received 19th April 1920.]

The value of hydrocyanic acid gas in controlling mosquitos [*R.A.E.*, B, vi, 57; vii, 126] has been confirmed by further experiments carried out in cellars of inhabited houses. Details of the work are given.

**Speckkäferlarven** (*Dermestes lardarius*, **L.**) **als Schädiger im Geflügelstall.** [*Dermestes lardarius*, L., as a Pest of Poultry-houses.]—*Zeitschr. f. angew. Entom., Berlin*, v, no. 1, 1919, pp. 130–132. [Received 19th April 1920.]

*Dermestes lardarius*, L., is recorded as occurring in poultry houses where much damage is caused by the larvae attacking newly emerged ducklings and chickens. In the case under observation the beetles were found breeding in a pigeon loft that was immediately above the poultry house. The infestation was noticed in 1918 and in June of that year the premises were well cleaned with dilute lysol and soda ; when inspected in November 1918 no fresh infestation was noticed.

NETOLITZKY ((F.). **Eine neue Gruppe blasenziehender Käfer aus Mitteleuropa** (*Paederus*, **Staphylinidae**). [A new Group of Blister-raising Beetles from Central Europe.]—*Zeitschr. f. angew. Entom., Berlin*, v, no. 2, 1919, pp. 252–257, 2 figs. [Received 19th April 1920.]

The Staphylinid beetles, *Paederus ruficollis*, F., *P. gemellus*, Kraatz, *P. riparius*, L., *P. fuscipes*, Curt., *P. limnophilus*, Er., and *P. litoralis*, Grav., are recorded as being capable of producing skin irritation in man [*R.A.E.*, B, iv, 15, 51, 167.] It is also noted that another Staphylinid, *Oxytelus tetracarinatus*, Block, frequently occurs as a foreign body in the eye, causing great discomfort.

HASE (A.). **Über ein Massenauftreten der Schmeissfliege,** *Calliphora vomitoria*, **L. Ein Beitrag zur Fliegenplage.** [The Abundance of *Calliphora vomitoria*, L. ; a Contribution on the Fly Plague.]—*Zeitschr. f. angew. Entom., Berlin*, v, no. 2, 1919, pp. 258–260, 1 fig. [Received 19th April 1920.]

Among 2,793 flies caught in a small room that had been used for storing potatoes, 2,177 proved to be *Calliphora vomitoria*, L. At the time of this observation the room in question had been cleaned out and shut up for about 6 weeks. As this large number of flies must have been the descendants of a few hibernating individuals or of adults that subsequently emerged from pupae accidentally carried in with the potatoes, the necessity for the application of early remedial measures is emphasised.

WILHELMI (J.). **Zur Biologie der kleinen Stubenfliege,** *Fannia canicularis*, **L.** [Biology of *Fannia canicularis*, L.]—*Zeitschr. f. angew. Entom., Berlin*, v, no. 2, 1919, pp. 261–266. [Received 19th April 1920.]

The eggs of *Fannia canicularis*, L., are laid from the beginning of the warm season until the autumn, preferably on decaying parts of plants. They hatch in about one to two days. Adults may be found in human habitations as well as stables, etc., but this fly never becomes a nuisance like *Musca domestica*, L., although it may prove a passive carrier of disease. Owing to its habit of circling round some dependent object near the ceiling it may be easily caught by means of suspended gummed strips. It is apparently less attracted to food than *M. domestica*.

LAKON (G.). **Bemerkungen über die Überwinterung von** *Empusa muscae.* [Remarks on the Hibernation of *Empusa muscae.*]—*Zeitschr. f. angew. Entom., Berlin*, v, no. 2, 1919, pp. 286–290. [Received 19th April 1920.]

The possible ways in which *Empusa muscae* may pass the winter are discussed and the opinions of earlier authors are quoted. The present author suggests *Pollenia rudis*, F., as one of many hosts which might harbour the spores of this fungus during the winter, but he does not exclude the possibility of hibernating spores, although their presence has not been ascertained except in one isolated case.

ANDRES (—). **Mutmasslicher Parasit von** *Calandra oryzae*, **L.** [A supposed Parasite of *Calandra oryzae*, L.]—*Zeitschr. f. angew. Entom., Berlin*, v, no. 2, 1919, p. 315. [Received 19th April 1920.]

The occurrence of an irritating skin eruption among millhands that came in contact with grain imported from Rumania to Germany is recorded. It was thought to be due to *Calandra oryzae*, as the grain was heavily infested with this weevil, but the author is of opinion it was caused by the mite, *Pediculoides ventricosus*, which has already been recorded as noxious to man [*R.A.E.*, B, vii, 161], and is probably also a parasite of *C. oryzae*, L.

SWELLENGREBEL (N. H.) & SWELLENGREBEL-DE-GRAAF (J. M. H.). **Observations on the Larvae-destroying Action of small Fish in the Malay Archipelago.**—*Jl. Trop. Med. & Hyg., London*, xxiii, no. 7, 1st April 1920, pp. 77–79.

In the Malay Archipelago there occur several species of fish that as adults or young forms may be induced to eat Anopheline larvae.

The larvae observed on various occasions in the course of this investigation were those of *Anopheles subpictus* (*rossi*), *A. hyrcanus* (*sinensis*), *A. barbirostris, A. ludlowi, A. vagus, A. aconitus, A. fuliginosus.*

*Haplochilus panchax* and, to a lesser degree, *Ophiocephales striatus* and *Dangila cuvieri* are good larva destroyers when kept together with the larvae in vessels free from vegetation. The influence of vegetation can be reduced by washing the plants so as to diminish the amount of adhering organisms. The protection afforded to larvae by plants is not therefore a mechanical one but due to their providing the fishes with other food.

The close relation between aquatic vegetation, larvae and fish is due to the fact that both the latter derive their food from the former. Destruction of the vegetation deprives the larvae of their food.

Regarding *H. panchax* the above conclusions only hold for salt or brackish water. In rice-fields its larva-destroying qualities were quite apparent in the absence of vegetation, at least as regards *Anopheles ludlowi*.

It may therefore be stated that in salt-water much good should not be expected from these fish ; in fresh-water, especially rice-fields, their usefulness increases and may be taken advantage of in connection with other measures, viz. : timely cutting of the rice (before the stalks go down) and draining off the irrigation water as soon as it is no longer necessary.

PETTIT (R. H.). **Roach Control.**—*Jl. Econ. Entom., Concord, N.H.*, xiii, no. 2, April 1920, p. 260.

A bait that has been found effective against *Periplaneta americana*, a large cockroach that has been established for several years in the buildings of the Michigan Agricultural College, consists of a thin gruel of cotton-seed meal sweetened with a little molasses and cooked; to this when cool, is added a cake of yeast, and, when fermentation has started, a little dry powdered lead arsenate is stirred in. The bait must be kept moist to be effective.

BALFOUR (A.). **War against Tropical Disease.**—*London*, Wellcome Bureau of Scientific Research & Baillière, Tindall & Cox, 1920, 220 pp., 180 figs., 2 graphs in wallet. Price 12*s.* 6*d.* net.

The papers in this book have been termed seven sanitary sermons addressed to all interested in Tropical Hygiene. All have previously appeared except that on "The Palm from a Sanitary Standpoint." Those on "Tropical Problems of the New World" and "The Medical Entomology of Salonica" have already been noticed [*R.A.E.*, B, iii, 69; iv, 179]. The contents of "Preventive Inoculation against Typhoid and Cholera" and "Sanitary and Insanitary Makeshifts in the Eastern War Area" are indicated by their titles. "Some aspects of Tropical Sanitation" and "The Problem of Hygiene in Egypt" deal with the prevention of diseases which are communicated by bad sanitation, the majority being insect-borne or helminthic. The difficulties of climate, environment and population are considered, and the faults of the present system, with a Central Administration somewhat out of touch with the Public Health Department are indicated. A solution of the latter problem under a Ministry of Health as recommended by the recent Commission is outlined.

The book as a whole is intended to emphasise the importance of Tropical Hygiene and to bring home its lessons both to medical and lay readers. It is a very interesting introduction to the subject rather than a text-book, but, even so, its value would have been increased by an index.

JAMES (Lt.-Col. S. P.). **Malaria at Home and Abroad.**—*London*, John Bale, Sons & Danielsson, Ltd., 1920, 234 pp., 104 figs., Price 25/- net.

This book gives a more extended account of the subjects dealt with in an article published by the Local Government Board [*R.A.E.*, B, vi, 236]. It is intended as a guide to medical men and administrators who may have to deal with malaria at home or abroad during peace or war. The malaria parasite is described, together with its stages in man and in the mosquito. An account is given of mosquitos, their life-history and their control. The system of making a malaria survey is described, while the clinical aspect of the disease and the symptoms, diagnosis and treatment of it and of its complications are dealt with in detail, as well as the methods of malaria prevention and eradication.

JAMES (Lt.-Col. S. P.). **Risks of Spread of Malaria in Relation to Demobilisation.**—*Repts. Local Govt. Bd. on Public Health and Med. Subjects, London,* New Ser., no. 123, 1919, pp. 25–28.

The potential risk of spreading malaria by the introduction of malaria carriers into rural areas of England is discussed, with special reference to demobilisation. As a result of observations made it is considered that the degree to which there is close and continuous association between the malaria carrier, the Anopheline and the susceptible person is the factor that determines whether new cases will occur in a potentially malarious locality or not.

The requisite degree of close and continuous association is only likely to occur in the particular type of dwelling that *A. maculipennis* selects as its permanent resting and feeding place, such as the ill-lighted ill-ventilated malarious houses at Queenborough.

GROVE (A. J.). **Some Observations on the Prevalence and Habits of Anopheline Mosquitos in England.**—*Repts. Local Govt. Bd., on Public Health & Med. Subjects, London,* New Ser., no. 123, 1919, pp. 29-39, 1 fig.

The bulk of the information contained in this paper has been noticed previously [*R.A.E.*, B, vii, 110].

CARTER (H. R.). **Malaria in England in 1917 and 1918.**—*U.S. Public Health Repts., Washington. D.C.*, xxxiv, no. 46, 14th November 1919, pp. 2605–2608. [Received 22nd April 1920.]

This paper is an analysis of the reports and papers issued by the Local Government Board dealing with the position as regards malaria in England owing to the importation of a large number of men infected with the disease in 1916, 1917 and 1918.

In the past, malaria used to be prevalent in many parts of England, especially the Fens and Kent; but the country was almost free from it in 1914. Of the three British Anophelines, *Anopheles maculipennis*, which corresponds to the American *A. quadrimaculatus*, is an efficient carrier of malaria. The form of malaria that existed in England in 1914 was so mild and so infrequent as to be unnoticed (the introduced form is much more severe), and it may be taken as a rule that if the biological conditions of the insect host are such that malaria, once prevalent, spontaneously disappears, any outbreak of malaria, caused by the introduction of carriers, will be temporary only. For example, though in 1917 over 10,000 infected men were imported, there were only 231 cases of malaria contracted in England. The author considers that the measures of control in that year may be almost disregarded. If these conditions of conveyance continue, the malaria introduced in 1917 will be of no sanitary importance within a year or two. The actual rapidity of the spontaneous decrease will probably depend mainly on the temperatures of the summers for the next few years—whether they are warm enough to allow of sufficient production of Anophelines and of sufficient development of the parasite in the mosquito to continue a fair percentage of the infection.

HUGHES (T. A.). **Identification of Three Strains of Trypanosomes from Cases of Sleeping Sickness contracted in Portuguese East Africa with** *Trypanosoma rhodesiense*.—*Indian Jl. Med. Research, Calcutta*, viii, no. 2, October 1919, pp. 464–474, 1 plate. [Received 29th April 1920.]

The cases from which the strains of trypanosomes here studied were obtained, contracted the disease in the north of Portuguese East Africa, a district infested with *Glossina morsitans*, the transmitter of *Trypanosoma rhodesiense*. *G. palpalis*, the carrier of *T. gambiense*, is believed not to occur in this part of Africa. The course of experiments in the inoculation of various animals (rats, monkeys, rabbits, sheep, a goat, a horse, and a baboon) are described. These experiments were made to confirm the diagnosis of the cases. *T. rhodesiense* has a peculiar typical posterior nuclear form and otherwise differs from *T. gambiense* in being more virulent, atoxyl-resistant, producing oedema of the face and keratitis in sheep and goats and in being susceptible to the action of human and baboon sera.

On the whole, from the course of the experiments, and of the disease in the human cases and the fact that they came from an area infested with *G. morsitans*, the strains were classified as *T. rhodesiense*. They were atoxyl-resistant and the disease was severe. There were few posterior nuclear forms in the sub-inoculated animals, showing that certain strains of this parasite may produce these forms in very small numbers and only in intense infections. The experiments on sheep tended to show that the pathogenicity for certain animals may vary in different strains.

RIVERA (A.). **Necesidad de Extirpar la Garrapata.** [The Necessity of Exterminating the Tick.]—*Repub. Dominicana, Direc. Agric.*, [*sine loco*], *Vulg. Agric.*, Leaflet no. 2, [n.d.], 4 pp., 2 plans. [Received 29th April 1920.]

The prosperity of the cattle industry in the Dominican Republic is heavily handicapped by the prevalence of bovine piroplasmosis, due to the micro-organism *Piroplasma bigeminum*, of which the vector is the cattle-tick, *Boophilus* (*Margaropus*) *annulatus*. The life-history of this tick is described and illustrated by a chart. The method advocated for extermination of this pest is the arsenical dip used in the United States [*R.A.E.*, B, iii, 35 ; i, vi, 143].

PILLERS (A. W. U.). **On the Occurrence of** *Tyroglyphus longior*, **Gervais, in Skin Scrapings of Horses.**—*Vet. Record, London*, xxxii, no. 1657, 10th April 1920, p. 475, 1 plate.

Attention is drawn to the occurrence of *Tyroglyphus longior*, Gervais, in the skin scrapings of horses. This mite is more frequently found in sarcoptic positive scrapings than in psoroptic positive scrapings, but it is most often found alone. The hypopial nymphs are fairly commonly met with on the horses skin.

HARDY (G. H.). **Australian Rhyphidae and Leptidae (Diptera).**—*Papers & Proc. R. Soc. Tasmania for the Year 1919, Hobart,* pp. 117–129, 1 plate.

This paper contains a key to the genus *Spaniopsis*, the females of which have blood-sucking habits. The species dealt with include: *S. tabaniformis*, White, from Tasmania and *S. vexans*, Ferg., *S. clelandi*, Ferg., *S. marginipennis*, Ferg., and *S. longicornis*, Ferg., from New South Wales.

RILEY (W. A.). **How to fight the Dangerous House Fly.**—*Univ. Minnesota, Agric. Ext. Div., St. Paul,* Special Bull. no. 48, March 1920, 8 pp., 7 figs.

This bulletin is designed to emphasise the importance of measures against the house-fly [*Musca domestica*]. The life-history of the insect is described and preventive measures considered, chiefly from the point of view of individual action, though community action, which alone can hope to eliminate the nuisance, is touched upon. Individual effort can secure considerable protection; cleanliness and sanitation are of first importance, and screens for doors and windows, particularly those of kitchens and similar places, are recommended. Various traps are described, the main principle of them all being a cone entrance with a small opening at the top. One of the best baits is bread and milk. Tainted meat is not particularly attractive, while it brings blow-flies from far and wide to become an additional nuisance. Fly-papers are useful at times, though the poisonous ones are dangerous. A teaspoonful of formalin in a pint of water or diluted milk is an effective poison, while castor oil, with or without the addition of a drop of croton oil, has also been recommended. Fly "swatting" unless done with discretion may produce results more insanitary than the flies themselves. Fumigation with powdered sulphur (2 lb. to 1,000 cu. ft. space) is sometimes desirable. As measures against the larvae, manure should be spread thinly over the fields in preference to being in heaps. Otherwise it should be kept in properly constructed, shaded bins. Chemical treatment is too expensive for general use, but the use of hellebore and borax is mentioned. The maggot trap [*R.A.E.*, B, iii, 134] is described at length.

GABERT (A.). **Gale des Pattes.**—*Vie Agric. et Rur., Paris,* xvi, no.18, 1st May 1920, p. 317, 1 fig.

Mange of the legs in fowls is caused by an Acarid, *Sarcoptes mutans*. In cases of slight infestation the legs should be soaped with a soft brush and after drying they should be coated with paraffin. If the disease is of long standing a hard brush should be used and the legs painted with an ointment consisting of 4 oz. of flowers of sulphur, 6 oz. of lard and 1 oz. of benzene. This paste should be applied 2 or 3 times at intervals of 3 to 4 days. The soil and perches, etc., should also be disinfected.

Symbiotic mange may be treated by the application of a lukewarm solution consisting of 10 drops of nicotine to 1¾ pints of water.

The lice, *Menopon biseriatum*, *M. pallidum*, *Lipeurus heterographus* and *Goniocotes gigas* (*abdominalis*), on fowls may be controlled by dusting the plumage with a 10 per cent. naphthaline powder. As much as 60 per cent. to 100 per cent. may be used for dusting, but this strength would prove fatal to the birds if rubbed into the skin. The best time for application is at night.

**Les Poissons d'Ornement et Mangeurs de Moustiques dans les Aquariums et les Pièces d'Eau.**—*Rev. Hortic. de l'Algérie, Algiers*, xxiv, no. 1–2, January-February 1920, pp. 32–34. [Received 5th May 1920.]

Ornamental fish that destroy mosquito larvae and are suitable for keeping in aquaria and other water in Algeria include *Cyprinodon iberus*, *Chromis* spp., *Hemichromis* spp., and especially *Macropodus* spp. *Macropodus paradisi* breeds rapidly in captivity. The adults should be fed on finely chopped meat and the small fry on infusoria that grow from lettuce tied up in muslin and floated in the water. In small tanks steps must be taken to prevent the fish jumping out of the water, and in winter some should be kept indoors to re-stock if those outside are killed by the cold.

LAURIE (D. F.). **New Regulations for Controlling Poultry Ticks and Lice, also Diseases.**—*Jl. Dept. Agric., S. Australia, Adelaide*, xxxiii, no. 8, March 1920, pp. 697, 698.

Attention is drawn to regulations (under the Stock Diseases Act, 1888), which are to be enforced at once, authorising inspectors to direct owners to take such measures as will be necessary to eradicate an infestation of tick or lice in poultry, and forbidding the removal of infested poultry without permission. The annual value of the poultry industry in S. Australia is nearly a million sterling and 90 per cent. of the ailments are traceable to poultry ticks [*Argas persicus*]. To check their spread all surplus woodwork in poultry-houses should be avoided. If possible, it is a good plan to burn all infested premises. Where this is not practicable, all woodwork should be dressed with kerosene, and cracks well flooded. All old crates used for poultry should be burned or saturated with kerosene.

(M. R.). **Les Moustiques et les Canards.**—*Jl. d'Agric. Pratique, Paris*, xxxiii, no. 20, 13th May 1920, p. 364.

An experiment is recorded in which two basins of equal size were made in a mosquito-infested stream, one being stocked with fish and the other with ducks. That containing fish continued to show mosquitos in all stages, but after two days that containing ducks was freed from mosquito larvae and pupae. This confirms previous observations of the usefulness of ducks in mosquito suppression.

**On the Trail of the Yellow-Fever Germ.**—Separate from *The American Review of Reviews*, [*sine loco*], April 1920, 8 pp., 5 figs.

This is a popular account of the history of the discoveries relating to yellow fever, leading up to the work of the Rockefeller Institute in 1919. It is claimed that Dr. Noguchi has found the germ of this disease and successfully cultivated it from the blood of men and guinea-pigs. It is closely related to that of infectious jaundice and has been named *Leptospira icteroides*. The work is still being continued.

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Radcliffe (L.). **Fishes destructive to the Eggs and Larvae of Mosquitoes.**—*Dept. Commerce, Bur. Fish., Washington, D.C.*, Economic Circular no.17, 1st July 1915, 19 pp., 28 figs. [Received 18th May 1920.]

In considering the fish that are suitable in the United States for destroying the early stages of mosquitos, the habits of any particular species of mosquito and its usual breeding places must be considered if success is to be attained. Some breed in casual collections of water where fish could not be introduced, while various species of fish are adapted for ponds, ditches, artificial reservoirs or running water.

Fresh water larvicidal fish include :—*Fundulus diaphanus*, *F. dispar*, *F. notatus*, *F. chrysotus*, *F. nottii*, *Enneacanthus obesus*, *E. gloriosus*. *Lepomis gibbosus*, *L. cyanellus*, *Notemigonus chrysoleucus*, *Carassius auratus*, *Gambusia affinis*, *Heterandria formosa*, *Mesogonistius chaetodon*, *Centrarchus macropterus*, *Labidesthes sicculus*, *Elassoma zonatum*, *E. evergladei* and *Mollicinsia latipinna*.

Those suitable for brackish or salt water: *Fundulus majalis*, *F. heteroclitus*, *F. grandis*, *F. similis*, *Lucania parva*, *L. venusta* and *Cyprinodon variegatus*. When fish are sent by train the journey should be as short as possible, and the water kept at an even temperature and well aerated.

Bevan (L.E.W.). **African Coast Fever. (Revised).**—*Rhodesia Agric. Jl., Salisbury*, xvii, no. 2, April 1920, pp. 118–129, 5 plates, 5 figs.

The bulk of the information contained in this paper has been noticed previously [*R.A.E.*, B, iii, 211]. African coast fever is transmitted by the bite of certain ticks including *Rhipicephalus appendiculatus* (brown tick), *R. evertsi* (red-legged tick), *R. simus* (black-pitted tick), *R. capensis* (Cape tick) and *R. nitens* (shiny brown tick), the first-named being the most important.

**Steam as a Bedbug Eradicator.**—*Public Health Repts., Washington, D.C.*, xxxiv, no. 48, 28th November 1919, pp. 2713–2714. [Received 21st May 1920.]

Attention is drawn to the successful control of bed-bugs [*Cimex lectularius*] by steam in a large house containing 70 rooms. The house was heated by radiators and pipes that had an exposed tap in every room. The plugs of the taps were removed and by raising the pressure to 80 or 100 pounds a temperature of 160° F. was obtained in about 2 hours and kept up for about 3 hours. As no bugs were found 2 months after this procedure, it is suggested that the process should be repeated 3 or 4 times a year.

Uriarte (L.). **La Profilaxis antipestosa y la Enseñanza popular.**—*Anales Dept. Nac. Higiene, Buenos Aires*, xxv, no. 6, November-December 1919, pp. 7–13. [Received 21st May 1920.]

This paper contains a popular appeal to the public emphasising the necessity of cleanliness, sanitation and hygiene in houses as the best means of protection against infestation by fleas and rats, and therefore the surest method of eliminating the danger of bubonic plague. The regulations enforcing measures against rats are also enumerated.

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BARBIERI (A.). **Profilaxis del Paludismo en el Ejército de las Zonas endémicas.**—*Anales Dept. Nac. Higiene, Buenos Aires*, xxv, no. 6, November-December 1919, pp. 15–23. [Received 21st May 1920.]

The anti-malarial measures and prophylaxis practised during the Balkans, Dardanelles and Palestine Campaigns [*R.A.E.*, B, viii, 91] are outlined, as emphasising the importance of malaria prevention and of the improvement of the physique of soldiers and inhabitants of the endemic areas.

FREEBORN (S. B.). **Malaria Control. A Report of Demonstration Studies at Anderson, California.**—*California State Bd. Health. Mthly. Bull., Sacramento*, March 1920, pp. 279–288, 4 figs., 2 diagrams.

A demonstration of anti-malaria work was conducted during the summer of 1919 for which purpose a grant of about £2,000 was allowed from the emergency fund. The climate and topography of the country are described. *Anopheles quadrimaculatus occidentalis* proved to be the predominant mosquito. The project included the control of mosquito breeding and the treatment and protection of persons. This involved oiling and draining of pools and the screening of houses as well as general prophylaxis. The measures successfully adopted in other projects have been followed in every instance and are described.

JURITZ (C. F.) **The Use of Hard or Saline Waters for Sheep Dipping.**—*Jl. Dept. Agric., Pretoria*, i, no. 1, April 1920, pp. 40–44.

From several districts of the Union of South Africa complaints have been made with regard to the inefficacy of various proprietary brands of sheep dips. Experiments have shown that the salt content of the local waters influences the solubility of the dip and that further analyses and tests are necessary to determine the most suitable dip for a given locality.

WEBB (J. L.). **Practical Hints for the Prevention and Eradication of East Coast Fever.**—*Jl. Dept. Agric., Pretoria*, i, no. 1, April 1920, pp. 58–63.

This paper is a reiteration of measures already advocated for the prevention and eradication of African coast fever, together with a few notes on their practical application.

LITTLEWOOD (W.). **Annual Report of the Veterinary Service for the Years 1916 and 1917.**—*Minist. Agric. Egypt, Cairo*, 1920, pp. 1–30 & 1–25. [Received 27th May 1920.]

Owing to the abundance of *Tabanus taeniola* and *T. ditaeniatus* in the Suez Canal Zone during 1915, a considerable number of cases of trypanosomiasis occurred in army camels. No cases of this disease are recorded from the same region for 1916, but both the Tabanids and the disease were prevalent in certain localities of the western oases. During 1917 additional information was gained on the distribution of trypanosome-carrying Tabanids.

*Filaria lachrymalis* was found in about 30 per cent. of aged Egyptian cattle. The filarial parasite infesting the conjunctival sac of camels was identified as *Thelasia leesei.* During 1917 experiments were made with a view to finding an inexpensive material for the prevention of parasitic mange in camels, arsenical dips having proved ineffective.

COOPER (H.). **Note on the Treatment of Camels for Mange in the Districts.**—*Ann. Rept. Vet. Service, 1916, Minist. Agric. Egypt, Cairo,* 1920, pp. 38–40. [Received 27th May 1920.]

In these experiments the dressing as supplied by the Ministry and consisting of 1 gal. of whale-oil, 2 lb. of sulphur and ¼ lb. of sodium carbonate was used, about 2 pints being the maximum amount used for one animal at a time. Of 53 camels thus treated only four were apparently not cured.

COOPER (H.). **Note on the Spraying of Animals for the Killing of Ticks.**—*Ann. Rept. Vet. Service, 1916. Minist. Agric. Egypt, Cairo,* 1920, pp. 44–47. [Received 27th May 1920.]

The number of applications from owners to have their cattle sprayed increased considerably during 1916. Arsenical dips were used and 3,911 animals were treated. The necessity of supplementing this treatment by thorough disinfection of stables is emphasised. It is hoped to continue the work on a larger scale in future and it is suggested that the practicability of laying down permanent dipping tanks should be considered.

FISKE (W. F.). **Investigations into the Bionomics of** *Glossina palpalis.* —*Bull. Entom. Research, London,* x, no 4, May 1920, pp. 347–463.

A two-years' study has been made in Uganda of tsetse-fly conditions and a mass of information has been collected which for the present remains largely inapplicable, as the data obtained have to a great extent reversed the original plans for the suppression of sleeping sickness in Uganda, while no new working basis has as yet been laid down. The accepted theory upon which suppressive and preventive measures have been based in the past was that complete severance of contact between fly and population was necessary in order to control the disease ; in practice, however, it has been proved sufficient to reduce the density of *Glossina palpalis* to within moderate limits in populated districts or to reduce density of population to within moderate limits in fly-infested territory. This being so, knowledge regarding the influences that control the range of the fly is more or less superfluous, while knowledge of the factors that operate to control breadth of contact between fly and population (equivalent to frequency of contact between hungry flies and men) is specifically required.

Investigations with a view to determining the reason for the low female percentage in catches indicate that this is rather due to the relative inactivity of the females than to the absence of the sex. Females are probably only to be caught when hungry and seeking food. The real sex-ratio is probably determined by respective longevity of the sexes, which is perhaps a variable quantity. The density of infestation being equal, the fly is far more likely to feed upon man where wild hosts are very few and the female percentage very high than when they are very many and the female percentage low; the female percentage may thus be a very valuable index to the chances favouring the transmission of human trypanosomiasis. Shelter is an important factor in determining the sex ratio, high percentage of females being associated with a type of vegetation known to be particularly repugnant as shelter and low percentage with vegetation known to be attractive.

While *Glossina palpalis* is a riparian species, it is found that water or humid conditions are not of direct benefit to the fly, nor required by it. The proper combination of food, shelter and breeding-places requisite to its existence, however, occur so infrequently away from the shores of lakes or banks of larger streams that it is perforce riparian in habit, its dense occurrence usually being limited to about 50 yards inland from the shore ; beyond 100 to 200 yards flies appear only as stragglers ; at 300 to 500 yards they will practically disappear, unless some special cause for their occurrence exists, such as the presence of unusually large numbers of game animals. The two favourite hosts of *G. palpalis*, namely, the crocodile and *Varanus* (monitor lizard) are amphibious in habit. They are not only the most attractive to the fly, but the most favoured breeding-grounds of the fly are frequently identical with spots selected by the crocodile for breeding places or by *Varanus* as a basking ground. *G. palpalis* therefore becomes almost a specific parasite of these reptiles. The habits and habitats of the various hosts of the fly in the region of Victoria Nyanza are discussed, with notes and observations indicating the practicability of controlling the fly through extermination of its hosts. It is considered that complete extermination of the four principal hosts (crocodile, *Varanus*, situtunga and hippopotamus) would cause a reduction in density of infestation amounting to 95 to 99 per cent. Food, however, even when abundant and of a preferred variety, is valueless to the fly unless adequate protection in the form of both shelter and breeding grounds also occurs within reach of the food. If protection is adequate, the range and density of *G. palpalis* are controlled by the quantity of preferred food occurring within reach, and the distance separating food from protection is a factor of the first importance in determining the prevailing degree of infestation.

Breeding-places are frequently chosen in sand or gravel, but fine, dry vegetable débris serves as well. Typical breeding-grounds in places distant from the shore are described and the correlation between these and density of the fly is discussed. An important conclusion reached is that massive shelter is requisite to the life of *G. palpalis*, and that, while lightly sheltered areas may provide the best and most attractive hunting, breeding and assembling grounds for the species, unless they lie within easy reach of the fly from massive shelter they will not be infested.

The necessary constituents of a proper combination of the requisites of life for the fly are discussed. While no specific observations on the subject were made, the tentative conclusion is reached that unless all three requisites, namely, good shelter, breeding-ground and the blood of vertebrates, occur within a radius of less than 100 yards from a central point, the conditions of life are so unfavourable that the species cannot exist. Within such favourable zones, natural increase of fly from generation to generation exceeds mortality, while dispersal into surrounding unfavourable zones results in mortality exceeding natural increase, and thus a natural balance is maintained so long as flies are free to disperse from the infested centres to surrounding zones. If dispersion is interfered with, this balance is upset, but this very rarely happens in nature.

The inimical factors in the bionomics of *G. palpalis* are discussed. It is considered wholly impractical to attempt any control measure involving artificial destruction of the flies, and wholly necessary to rely upon measures designed to deprive them of either food or protection or to render food less available to them. The clearing measures already in use have proved efficacious on many occasions. The maximum of economy and efficiency is to be gained through clearing at the centres of infestation, where natural increase is most rapid, for by clearing these the dispersal of flies into the surrounding zone is prevented and the effect is general. In discussing the degree of density that may be considered obnoxious, the belief is expressed that a density, as measured by the males to be caught per boy per hour, of 6·0 is normally safe and sanitary, but that one of 15·0 or 20·0 would ordinarily be dangerous. The expense of reducing density to 0 everywhere would be too great to be considered.

NUTTALL (G. H. F.). **On Coloration in Ticks, ii.**—*Parasitology, Cambridge*, xii, no. 1, January 1920, pp. 1–6, 2 plates.

The ticks dealt with include *Amblyomma hebraeum*, *A. gemma*, *Dermacentor venustus*, *D. variabilis* and *D. reticulatus niveus*, the coloration of which, as seen in living examples, is depicted for the first time. The colour-producing layer may be removed by the use of caustic potash.

Attention is drawn to the desirability of recording the colours of ornate ticks when alive.

NUTTALL (G. H. F.). **Regeneration of the Mouthparts and Legs in Ticks.** *Argas persicus*, *Amblyomma hebraeum* **and** *Hyalomma aegypticum*.—*Parasitology, Cambridge*, xii, no. 1, January 1920, pp. 7–26, 6 figs.

The contents of this paper are indicated by the title.

NUTTALL (G. H. F.). **On Fahrenholz's purported New Species, Sub-Species and Varieties of** *Pediculus*. **A Criticism of Methods employed in describing Anoplura.**—*Parasitology, Cambridge*, xii, no. 2, March 1920, pp. 136–153, 2 charts.

Attention is drawn to certain grave sources of error underlying the present mode of differentiating Anoplura and more especially species of the sub-order Siphunculata. This paper is divided into three parts dealing with Fahrenholz's descriptions of supposedly new species, etc., the authors detailed criticism thereon, and his conclusions therefrom in respect of the synonymy of *Pediculus humanus*.

Buxton (P. A.). **Body-Lice under Summer Conditions in Mesopotamia.**—*Parasitology, Cambridge*, xii, no. 2, March 1920, pp. 173–174.

Attention is drawn to the absence of body lice [*Pediculus humanus*] during the summer in countries with very dry climates. The summer in Mesopotamia appears to be very unfavourable for the reproduction of this species, as it is generally very dry and the maximum shade temperature normally exceeds 105° F. on most days of the four summer months and may reach 120° F. or more.

Friederichs (K.). **Untersuchungen über Simuliiden.** [Investigations on Simuliids.]—*Zeitschr. f. angew. Entom., Berlin*, vi, no. 1, September 1919, pp. 61–83, 15 figs. [Received 19th April 1920.]

Simuliids may be found in Germany in any flowing stream running through pastures, provided the water is rich in oxygen. The most common species are *Simulium reptans*, L., and *S. maculatum*, Meig. Hibernation occurs in the larval stage. The technique employed in breeding these flies is described.

With regard to their control the measure suggested as likely to be successful is the systematic clearing of all streams in the vicinity of pastures from weeds and undergrowth ; this should be done early in the spring before pupation occurs, which may be any time between March and May.

As Simuliids are light-loving species the planting of alders or other suitable trees along the banks of the stream may prove effective.

Animals should be protected from the bites of these insects by ear-coverings and the provision of extensive shaded areas on pasture land. This may be supplied by trees or artificial shelters.

*S. angustitarse*, Lundström, so far only recorded from Finland, is now reported from the vicinity of Berne.

Frickhinger (H. W.). *Chelifer cancroides* **als Feind der Bettwanze** (*Cimex lectularius*, **L.**). [*Chelifer cancroides* as an Enemy of the Bed-bug, *Cimex lectularius*, L.]—*Zeitschr. f. angew. Entom., Berlin*, vi, no. 1, September 1919, pp. 170–171. [Received 19th April 1920.]

*Chelifer cancroides* is recorded as being predaceous on bed-bugs, *Cimex lectularius*, L., in the Government of Perm in the Ural Mountains.

**Milbenbefallene Futtermittel als Ursache von Haustiererkrankungen.** [Mite-infested Fodder as Cause of Disease in Domestic Animals.]—*Zeitschr. f. angew. Entom., Berlin*, vi, no. 1, September 1919, pp. 173–174. [Received 19th April 1920.]

Attention is drawn to the importance of disinfecting fodder to prevent internal injury to stock. Clover infested with the mite, *Acarus foenarius*, has proved very injurious to animals and *Tyroglyphus* (*Aleurobius*) *farinae* is found in abundance in stored foodstuffs.

**Die Dasselplage** (*Hypoderma bovis*). [Bot Fly.]—*Zeitschr. f. angew. Entom., Berlin,* vi, no. 1, September 1919, pp. 176–180. [Received 19th April 1920.]

The measures in Germany for controlling the bot-fly, *Hypoderma bovis*, were interrupted in 1914 owing to the outbreak of war. As a result this pest has spread to previously uninfested localities. The necessity for organising a systematic campaign, which should include the teaching of bot-fly control measures in the village schools, is emphasised.

WILHELMI (J.). **Die hygienische Bedeutung der angewandten Entomologie.** [The hygienic Importance of Applied Entomology.]—*Flugschr. Deutschen Gesellsch. f. angew. Entomologie, Berlin,* no. 7, 1918, 27 pp., 13 figs. [Received 19th April 1920.]

The insects noxious to mammals either in the form of direct parasites as or as transmitters of disease are reviewed. The preventive as well remedial measures against these pests are outlined, and the importance of applied entomology with reference to their control is emphasised.

PRELL (H.). *Anopheles* **und die Malaria.** [*Anopheles* and Malaria.]—*Flugschr. Deutschen Gesellsch. f. angew. Entomologie, Berlin,* no. 9, 1919, 61 pp., 8 figs. [Received 19th April 1920.]

The danger of the spread of malaria in Germany owing to the demobilisation of troops is pointed out, and the usual precautionary and remedial measures including notification of cases are discussed. In an appendix advice is given on the best method of collecting and forwarding suspected material for identification, as well as the preparation of blood smears. *Anopheles maculipennis*, Meig., *A. bifurcatus*, L., and *A. plumbeus*, Hal. (*Coelodiazesis nigripes*, Staeg.) are the mosquitos of chief importance in Germany.

SWELLENGREBEL (N. H.). **Report on Experiments upon the Development of Malaria Parasites in some Anophelines.**—*Meded. Burgerlijk. Geneesk. Dienst Nederl.-Indië, Weltevreden,* 1919, no. 9, pp. 53–71, 4 charts. [Also in Dutch.]

The results with subtertian, tertian and quartan malaria are first given separately, and after correction the final results with experiments on 1,058 mosquitos are shown together in one table.

In the case of *Anopheles ludlowi* and *A. hyrcanus* (*sinensis*) both the stomach and salivary glands were examined; in the case of the other species the stomach only.

With *A. ludlowi* the percentages for subtertian, tertian and quartan malaria were 100, 80 and zero; with *A. hyrcanus* these figures were 5, 40·6 and 1; with *A. umbrosus* there was a 5 per cent. infection with quartan; with *A. barbirostris* 13 per cent. with quartan; with *A. punctulatus* 4·3 per cent. with subtertian; and with *A. kochi* 16·7 per cent. with tertian.

Negative results were obtained with *A. albotaeniatus*, *A. indefinitus*, and *A. leucosphyrus*.

Judging by these experiments *A. ludlowi* is the most important carrier of malaria with the exception of the quartan form; the less favourable results of the tests with tertian malaria may be due to the fact that the tertian parasite does not develop so easily in this species as the subtertian. *A. hyrcanus* appears to be a fairly good carrier of tertian, and it is surprising that so few of these mosquitos are found infected in a natural state. The negative results with *A. hyrcanus* and subtertian malaria are very striking, as the experimental conditions were abnormally favourable to infection. This result also applies to *A. umbrosus* and is strange in view of the observations made in Malacca, but it agrees with those of Roper in British North Borneo [*R.A.E.*, B, iii, 10]. The most remarkable fact in connection with the quartan experiments was the non-infectability of *A. ludlowi*, which justifies the assumption that this species is less susceptible to infection with quartan than with subtertian or tertian malaria. *A. hyrcanus* proved to be susceptible in a slight degree only.

SWELLENGREBEL (N. H.). **Aanvullingen en Verbeteringen op Swellengrebel's Anophelinen van Nederlandsch-Indië.** [Complementary and Emendatory Notes to Swellengrebel's "Anophelines of the Dutch East Indies."]—*Koloniaal Instituut te Amsterdam* [n.d.], 31 pp., 9 plates. [Received 5th May 1920.]

The title of this small volume explains its contents. The original monograph has already been noticed [*R.A.E.*, B, vii, 19].

SWELLENGREBEL (N. H.) & SWELLENGREBEL DE GRAAF (J. M. H.). **Addenda to Description of Larvae of Netherlands' Indian Anophelines.**—3 pp., 2 plates. Issued with *Meded. Burgerlijk. Geneesk. Dienst Nederl.-Indië, Weltevreden*, 1919, no. 9. [Received 19th May 1920.]

The main paper has already been noticed [*R.A.E.*, B, vii, 183]. The species dealt with in these additions are: *Anopheles* (*Nyssorrhynchus*) *annulipes* var. *moluccensis*, n., found in the Moluccas and western New Guinea breeding in salt and fresh water, even of a very dirty or putrid character; *A.* (*Stethomyia*) *aitkeni* var. *insulae-florum*, n., found in the Moluccas and the adult of which is indistinguishable from that of *S. aitkeni*, whereas the larval differences are marked; *S. aitkeni* var. *papuae*, found in running brooks of western New Guinea and the adult form of which is as yet unknown; and *A.* (*Neomyzomyia*) *punctulatus* var. *orientalis*, from northern Celebes, the Moluccas and eastern Java, which is founded on larval characters, as the adult does not differ from the type.

NOGUCHI (H.). *Leptospira icteroides* **and Yellow Fever.**—*Proc. Nat. Acad. Sci., Washington, D.C.*, vi, no. 3, March 1920, pp. 110–111.

As a result of investigations at Guayaquil, Ecuador, and subsequent experiments, *Leptospira icteroides* has been detected in certain cases of yellow fever, but cannot be regarded as the causative agent of the disease until its presence has been recorded in cases from elsewhere.

EDWARDS (F. W.). **A new *Trichocera* from Siberia (Diptera Polyneura).**—*Ann. Mag. Nat. Hist., London*, v, no. 29, May 1920, pp. 431–432, 1 fig.

A new mosquito, *Trichocera siberica*, sp. n., is here described from Verschininsk, Yenisei River, Siberia.

PIUTTI (A.) & BERNARDINI (L.). **Sulla Derattizzazione nei Trasporti navali mediante la Cloropicrina.** [The Destruction of Rats on Ships by Means of Chloropicrin.]—*Rend. Acad. Sci. Fis. Mat., Naples*, xxiv, ser. 3ª, nos. 1–3, January–March 1918, pp. 16–19. [Received 22nd June 1920.]

Successful experiments with chloropicrin against rats on ships are described.

**I Gas velenosi nella Distruzione degli Insetti dannosi alle Piante.** [Poisonous Gases for the Destruction of Insects injurious to Plants.]—*La Campagna, Como*, xix, no. 319, 15th April 1920, p. 2. [Received 3rd June 1920.]

A new company, Società Italiana Fumigazioni Gas Tossici, has been formed in Rome with the object of destroying noxious insects by the fumigation of buildings, ships, goods and plants with poisonous gases.

MALKMUS (B.). **Klinische Diagnostik der inneren Krankheiten der Haustiere.** [The Clinical Diagnosis of the Internal Diseases of Domestic Animals.]—*Leipzic*, Max Jänecke, 1920, 8th & 9th edition, vii + 232 pp., 67 figs. Prices 11*s*. 3*d*.

This useful little volume aims at giving in concise form all information helpful in enabling the veterinary surgeon to establish a correct diagnosis, and is the outcome not only of the author's own experience, but of that of veterinarians generally. The subject matter is divided according to the organs affected, and each section closes with a review of the diseases concerned.

The external parasites mentioned include lice, fleas, ticks and mites.

BEVAN (Ll. E. W.). **Inoculation of Cattle against Redwater and Gall-Sickness.**—*Rhodesia Dept. Agric., Salisbury*, Bull. 316, April 1919, 10 pp. [Received 1st June 1920.]

The system of inoculation of cattle against redwater and gall sickness with improved strains of virus is described. It is pointed out that progressive farmers, who keep their stock free from the blue tick [*Margaropus decoloratus*] by short-interval dipping, lose rather than gain under the present state of affairs, as their stock is not so readily saleable in spite of its better quality, owing to its greater liability to the diseases in question. This difficulty can be overcome by inoculation, and the practical utility of valuable imported stock, absolutely necessary for the improvement of the native breeds, can only be secured in this way.

Williams (T. H.). **Report of the Live Stock and Brands Department.**—*South Australia Rept. Minist. Agric. for Year ended 30th June 1919, Adelaide*, 1919, pp. 74–77. [Received 2nd June 1920.]

While great numbers of sheep in South Australia are still infested with lice, the number has been less than half the previous year's figures, owing to the compulsory dipping practised. The matter still requires very serious attention from sheep owners, and as infested sheep have been found by the inspectors outside the compulsory boundary of last season's dipping, the area has been extended.

The sheep bot fly, *Oestrus ovis*, is rapidly spreading all over the State, and nothing can be done to prevent it. [*R.A.E.*, B, vi, 93.]

Sarcoptic mange has been the cause of so many deaths among young pigs and of such bad condition in others that the Government has now proclaimed it a contagious disease. Owners have also been given notice to treat infected pigs, disinfect sties, etc.

**Bot-fly Remedy.**—*Queensland Agric. Jl., Brisbane,* xiii, no. 4, April 1920, p. 146.

A simple preventive suggested for infestation of sheep by bot-fly [*Oestrus ovis*] is to place Stockholm tar in the bottom of the trough to the depth of one inch, and cover it with salt. While the sheep are licking the salt, tar gets on the nose and into the nostrils and is said to prevent the bot-fly from depositing eggs or larvae in them.

Walden (B. H.). **Mosquito Work in 1919.**—*Conn. Agric. Expt. Sta., New Haven*, Bull. 218, 1920, pp. 193–196.

The drainage system on the salt marshes of Connecticut as an anti-mosquito measure was maintained in good condition throughout 1919. During the first half of the season the marshes were comparatively dry and free from mosquitos ; in the latter half of the season however conditions were extremely favourable for mosquito breeding, owing to frequent rains and high tides. As some exception has been taken to the provisions of the Act of 1917 [*R.A.E.*, B, vi, 190] defining the financial responsibilities of towns in infested areas for supervision and maintenance charges, this Act has been revised by an amendment which is quoted verbatim and which provides for the chief charges being met by the State. Details of the anti-malarial measures carried out in various localities are given. While no new mosquito works were constructed during the year, plans have been made for draining another 50 or 60 acres of salt marsh during 1920.

Sugai (C.) & Kawabada (K.). **Leprosy and Tubercle Bacilli, Viability of, in Alimentary Tract of the Fish and Fly.**—*Igaku Chuo Zasshi* [*Central Jl. of Med. Sci.*] no. 271, 5th February, 1918. (Abstract in *China Med. Jl.*, xxxiv, no. 2, March 1920, p. 170.) [Received 3rd June 1920.]

Experiments with flies fed with a suspension of tubercle bacilli showed that after five hours the abdominal contents and faeces contained tubercle bacilli which were pathogenic to guineapigs. It is considered probable that leprosy bacilli also retain their virulence in the fly, as similar experiments showed that both tubercle and leprosy bacilli do so if fed to fish.

LANG (W. D.). **A Handbook of British Mosquitoes.**—*Brit. Mus. Nat. Hist., London*, 1920, viii + 125 pp., 5 plates, 132 figs. Price £1.

This carefully prepared handbook has been compiled for the purpose of rendering easy the identification of British mosquitos, a subject that is of increasing interest owing to the introduction of numerous malaria-infested troops into the country, and the consequent importance that attaches to the Culicine fauna of the British Isles. The 21 species of mosquitos that occur within the Islands should be easily recognisable from the descriptions given of not only the adult stages, but also the larvae and pupae, and by a comparison of the many text-figures. The life-histories and structure of the various species including *Anopheles maculipennis*, *A. bifurcatus* and *A. plumbeus* are discussed, and a detailed account is given of each.

MACGREGOR (M. E.). **A Note on** *Dermatophilus penetrans*.—*Jl. R.A.M.C., London*, xxxiv, no. 5, May 1920, pp. 441–443.

The chigger flea (*Dermatophilus penetrans*) was very troublesome in places during the recent campaign in East Africa. This parasite occurs on both the western and eastern sides of the continent, around the Great Lakes, and here and there right across the continent. It has also spread to Madagascar, and has probably been carried by the movement of troops to many parts of Africa hitherto free from it.

It is especially active at night and in dry weather. The best method of removal from under the skin is described.

Attack may be prevented by the following precautions. The feet should be rubbed with vaseline daily after washing in the late afternoon [cf. *R.A.E.*, B, iii, 227], thick socks worn, and Keating's powder sprinkled in the boots. Bed-clothes should be aired on a cord well above the ground, and a little Keating's powder should be dusted between the sheets.

Cases of attack in the hands were confined to drivers in the Mechanical Transport, who often had to go on hands and knees in the dust to attend to their vehicles.

ROBERTSON (J. C.). **Report on the Anti-Malaria Campaign at Taranto during 1918.**—*Jl. R.A.M.C., London*, xxxiv, no. 5, May 1920, pp. 444–467.

The number of cases of malaria contracted at the Rest Camp at Taranto in 1917, in spite of the usual anti-malaria measures, made an extended malaria campaign in 1918 a matter of considerable urgency. Owing to the type of hut and gauze issued, which made mosquito-proof quarters almost unattainable, and the difficulty of bringing home to the floating population of a rest camp the necessity of anti-malaria measures with all the discomfort they caused, the destruction of mosquitos was regarded as almost the sole protective measure that was practicable.

The early work against the hibernating mosquito was pushed to the uttermost, and continued through the summer, the ground covered being extended as the necessary staff was trained. The breeding places were hard to deal with owing to the fact that the ground was very absorbent of water, which soaked through to form large marshy patches at the lower levels. Surface drains proved unsatisfactory, owing to their constantly becoming clogged, and a deeper system of draining was necessary, leading to a common outfall where the water was oiled with an automatic drip. Irrigation wells were oiled; other wells were fitted with pumps or lids. In other respects the work against breeding places was carried out on the usual lines, automatic drips resulting in a considerable saving of labour, while over half the oil used was waste oil.

The Anophelines found were *A. maculipennis* and *A. bifurcatus*, the former being more often infected. Their numbers showed a marked fall during the summer, instead of the usual rise, owing to the success of the work done. It was found that mosquitos could fly as far as a mile and a quarter to the camp. The anti-mosquito work was supplemented as far as possible by attempts to protect the troops from mosquito bites by quinine issues and the isolation of carriers. The results were very successful. Only a fractional percentage of primary infection occurred, probably only one case among several thousand troops. By contrast the neighbouring Italian anti-aircraft battery had a primary infection rate of 45·3 per cent., 26·4 per cent. becoming permanently ineffective.

HEARLE (E.). **Notes on some Mosquitoes new to Canada.**—*Canad. Entom., London, Ont.*, lii, no 5, May 1920, pp. 114–116.

Mosquitos recorded as new to Canada, and of which brief descriptions are given, include *Janthinosoma* (*Psorophora*) *sayi*, D. & K., of which a single specimen was taken in Ontario in August, attempting to bite at 8.30 a.m. *Aëdes triseriatus*, Say, which has formerly been recorded in the United States east of the Rocky Mountains, is fairly common in the woods of southern Ontario. Females only were taken and were found to bite fiercely during the day. Larvae were taken from a tree-hole in July. *A. aldrichi*, D. & K., was found to be the dominant mosquito in Fraser Valley, B.C. in 1919, having been previously recorded only from Montana and Idaho. The development of this species in Fraser Valley is apparently dependent on the fluctuations of the river. In seasons when the cotton-wood valleys around the river become flooded it is extremely abundant. The adults bite viciously and are so small that they can easily penetrate ordinary screening. *Anopheles quadrimaculatus*, Say, is apparently common in some parts of southern Ontario, though there are no previous records of its occurrence in Canada.

STEFANOPOULO (G. J.). **Sur la Présence du** *Spirochaeta icterohemorragiae* **chez les Rats d'Egout, à Paris.**—*C.R. Soc. Biol., Paris*, lxxxiii, no. 18, 29th May 1920, pp. 811–812.

In March 1920, *Spirochaeta icterohaemorrhagiae* was discovered in rats (*Mus decumanus*) taken from the sewers of Paris, and was inoculated into guinea-pigs which duly developed the disease (infectious jaundice). Previous examinations of sewer rats in Paris have given negative results. It is noteworthy that the spirochaetes were found after an unusually mild winter when human cases had been particularly numerous, and the infected rats were taken from the locality where it is known that epidemics occurred in 1865.

Roubaud (E,). **Les Conditions de Nutrition des Anophèles en France** (*Anopheles maculipennis*) **et le Rôle du Bétail dans la Prophylaxie du Paludisme.**—*Ann. Inst. Pasteur, Paris*, xxxiv, no. 4, April 1920, pp. 181–228.

This paper is a sequel to the author's previous work on the infective power of the Anophelines occurring in France [*R.A.E.*, B, vi, 230], which left certain problems concerning malaria in the hypothetical stage. The existence of Anophelines without malaria, and the obvious and spontaneous diminution of malaria in many of the previously-infested regions of western Europe and in particular in France, are questions that have required further study. It has been shown [*loc. cit.*] that the explanation does not lie in any acquisition of immunity on the part of *A. maculipennis*. It has been a cause of surprise, also, that the expected recrudescences of the disease consequent upon the return of malarial troops from abroad after the War have been insignificant. The indications were that *A. maculipennis*, the most abundant and widespread Anopheline in France, is not highly pathogenic in that country owing to some peculiarity in its biology that restrains its activities with regard to man.

Former records of the occurrence of this mosquito in France have always been based upon the finding of larvae, and conclusions have been drawn on this basis regarding its pathogenicity in a given region, although its appearance in the adult form may not have been observed nor the habits of flight and nutrition of the adults studied. In this connection it may be mentioned that various English writers, commenting upon the occurrence of Anophelines in England, have remarked that they have never known them to bite, and the same may be said of some of the most heavily infested regions in France.

It has generally been understood that *A. maculipennis* shows a decided preference for the blood of animals, the attraction being generally in proportion to the size of the host. It has also been remarked that *A. maculipennis*, while almost domesticated in Algeria and in the Vendée region in France, rarely approaches man in the neighbourhood of Paris. The explanation has been said to lie in the climate. It is admitted that climate is probably one factor, but malaria has raged, and does still, in various regions of northern Europe where the temperature is much lower than that of la Vendée.

The author has studied at great length the relative value of man and animals in the nutrition of Anophelines and believes that this is the key to the problem. His areas of investigation have been the marshes of the Vendée region and the environs of Paris. The topography of the country in la Vendée and the nature of the inhabitants and their buildings are described. The houses are of the most primitive type, low and frequently heavily thatched, and the cattle, the rearing of which is the chief industry, are frequently housed under the same roof. While the marshy region of la Vendée is probably more densely populated with Anophelines than any other part of the world, and in spite of the conditions of life of the inhabitants, malaria is rapidly disappearing throughout the region, and there has been no recrudescence in spite of the return of many malarial subjects from the War. A striking feature of the Anopheline incidence is that on the great marshes, where adults occur with particular density, larvae are extremely difficult to find, while in the dryer districts. where adults are relatively scarce, larvae may be found abundantly in the small isolated places where they breed. The explanation given is that on the great expanse of marsh the female Anopheline can choose many favourable breeding-grounds and disperse her eggs instead of concentrating them at one point, and thus all are favourably placed for development, while in the smaller, isolated breeding-grounds the Anopheline density is limited by the competition among the larvae concentrated there. It is clear therefore that the number of adults observed is the only accurate estimate of Anopheline density.

Investigations have shown that the Anophelines have entirely adapted themselves to sheltering exclusively in buildings of human construction and inhabited by either man or animals, for unoccupied buildings offer no attraction to them. It is evident, moreover, if only from the preponderance of females in buildings containing an animal host, that the shelters are sought for purposes of nourishment and not only for rest. Proof is abundant that *A. maculipennis* bites most frequently inside buildings, and the type of dwelling-place described above offers most attractive conditions for both nourishment and shelter. From repeated examinations of many of these houses it is clear that the number of Anophelines attracted to that part of the dwelling occupied by human beings is quite insignificant compared with the enormous quantities that may be caught in the neighbouring portion of the house occupied by domestic animals. Closer examination reveals the fact that human beings play a most unimportant rôle in the nutrition of Anophelines, and that the various domestic animals have not all the same value in this respect, cattle, horses and mules being the favourite hosts, pigs, goats and sheep being less attractive, and the smaller animals, such as rabbits, being of still less importance. Dogs and fowls are rarely bitten. In regions where *A. maculipennis* is the dominant mosquito it therefore follows that the maintenance of of the former animals in close proximity to human dwellings affords almost complete protection to man against the insects' attacks. In the examinations described, the average number of females that had recently drawn blood from man was 14·2 per cent., while those that had gorged upon domestic animals frequently exceeded 90 per cent. During the summer season, when the animals are kept out in the open both day and night, the stables no longer offer any attraction to female Anophelines, and although many may still be found there, they are invariably fasting and will readily attack any animal host in full daylight, including man. Wherever the inhabitants of a region complain of mosquito attacks, it is invariably the case that their stables contain but few animals.

In the Vendée region, two different sets of conditions occur ; in the drier districts, where the Anopheline density is not very great, the existing mosquitos find sufficient nourishment in the cattle of the district ; man is practically free from attack and may even be unconscious of the presence of large numbers of mosquitos in his near vicinity ; while in the marshy districts, where the Anopheline density is too great to find adequate nourishment in the cattle present, man is undoubtedly attacked, but even then the Anophelines seem to bite with repugnance and without entirely satisfying their hunger.

The conditions in the Paris region have been studied with equal thoroughness, and offer a close analogy with those of the non-marshy regions of la Vendée, namely, the occurrence of Anophelines in fair numbers, characterised by the exclusive adaptation of *A. maculipennis* to bovine hosts, which are present in sufficient numbers. So complete is this adaptation that the presence of the mosquitos often passes entirely unnoticed by man.

In order to obtain an accurate idea of the possible rôle of *A. maculipennis* in the transmission of malaria, the author has made some study of the activities of the adult mosquitos and their relations with their hosts, whether man or domestic animals. The normal period of activity is generally from midnight to 2 a.m., though in la Vendée the author has observed activity until dawn, that is, before 6 a.m. However favourable the conditions for nutrition may be in the spot where the female has spent the period of daily rest, it is always abandoned for flight in the open air at night, so that a new host must always be found for the meal before the next day's rest. The Anopheline population of any given shelter is therefore entirely, or almost entirely, renewed each night. If, therefore, all the Anophelines present in a certain building were captured and destroyed several days in succession, provided that the host conditions are favourable, the numbers would be constantly replaced, probably without any noticeable modification of the total. It has been proved, by marking some thousand individuals, that the Anopheline fauna of any given spot, however densely populated it may be, is entirely renewed within a few days' time. This regular flight in the open has been proved to be indispensable to the life of *A. maculipennis.* Repeated experiments have shown that when a score of *A. maculipennis* has been confined in a suitable building with varied and favourable host animals, water, and other necessary conditions, one or two individuals at most have been found alive at the end of ten days. After biting, the females of *A. maculipennis* fly to the walls or ceiling of the building, but remain in the near proximity of the host they have bitten. In the large, well-ventilated stables of the better kind of farm, with bare, clean walls and high ceiling, there are frequently no engorged females present, and in fact, animals kept in buildings 20 ft. or more in height seem to be as well protected from attack as though they were in the open air. It is thought that better conditions of hygiene and ventilation, with more lofty rooms, have probably done much also to lessen the relations between mosquitos and man.

Some authors have considered that animals are an inimical factor, encouraging a rapid multiplication of the numbers of Anophelines. This, however, is not the case. In the marshy districts of la Vendée, where the Anophelines are not sufficiently nourished, they occur with excessive density, while they are incomparably fewer in the environs of Paris, where the conditions of nourishment from cattle are very much better. The question is largely one of the presence or absence of favourable breeding grounds, which is the fundamental factor in Anopheline development. Malaria epidemics, the result of abnormal frequency of contact of *A. maculipennis* with man, may suddenly arise in a region well stocked with cattle merely in consequence of an increased number of breeding places due to flooding, and a consequent increase in the Anopheline population requiring greater nourishment. This has been known to occur in la Vendée. The immigration of small settlements of people with but few cattle in a marshy zone previously uninhabited may give rise to the outbreak of fresh malaria epidemics. This explains the occurrence, during the War, of several small foci of indigenous malaria reported from districts poor in cattle. The spontaneous decrease in malaria, so noticeable in the lowlands of la Vendée, in Flanders and Holland, and in the swamps of Tuscany, is coincident with the reclamation of these swampy areas and also with an alteration in the habits of the Anophelines owing to animals having been substituted for man as hosts. This seems to have been a slowly-acquired habit; the repugnance for human blood is certainly not primitive, all that is known of the malaria cycle points the other way, and in essentially malarial countries, such as the unhealthy parts of Italy described by Grassi, the eastern coast of Corsica, Algeria, Morocco, the East, etc., *A. maculipennis*, far from avoiding man, may be found engorged with blood in the majority of houses and encampments. The secondary adaptation of this species to animals in countries where domestic cattle are abundant seems to have produced a particular race of mosquito, which is distinguished not only by its tastes and affinities, but also by its greater size. In modifying their primitive habits of nutrition at the expense of man, the Anophelines of the cattle-stocked regions have broken the closed cycle followed hitherto by the malaria parasites, and suspended the endemic manifestations of the disease.

The author believes that there is an interesting possibility of introducing what he calls animal prophylaxis in malaria, that is, the importation of cattle to act as a protection to man, and this should be particularly successful in places where the development of the Anopheline fauna occurs in isolated breeding-places. The cattle stables might be used as traps, and if thorough and extensive destruction of the mosquitos were regularly practised during the period preceding the outbreak of malarial epidemics, the efficiency of the animal prophylaxis should be brought to its maximum. The biological necessities of other species than *A. maculipennis* would also have to be considered. It must be remembered also that the introduction of animal hosts is not by itself sufficient as an anti-malarial measure; the necessary conditions of stabling, etc., must also be complied with, and these will vary according to the species. For the purpose of considering this prophylaxis, the author divides Anophelines into two main groups, viz., entophilous species like *A. maculipennis*, that seek their hosts in rooms or closed buildings, stables, etc., and exophilous species like *A. bifurcatus*, that attack their hosts in the open air or under verandahs, sheds, etc. A third group might be called amphophilous, and would consist of those species that attack equally in or out of doors. The cattle used as protection would therefore have to be placed under conditions of attack corresponding to the different biological categories, the local methods of rearing cattle being modified more or less completely to suit the requirements of the human population. When the necessary local modifications are understood, it is believed that this new prophylactic measure would contribute largely to the elimination of malaria.

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Leon (N.). **Quelques Observations sur les Pédiculides.**—*Jl. Parasitology, Urbana, Ill.*, vi, no. 3, March 1920, pp. 144–147. [Received 7th June 1920.]

These observations concerning *Pediculus humanus* (*vestimenti*) were made during and after the epidemic of exanthematous typhus in Rumania in 1917. Experiments showed that various substances, chiefly essential oils that had previously been recommended, were not effective in preventing the attack of lice. The essences of eucalyptus, cloves and aniseed did not prevent oviposition on flannel, while hungry lice would feed in spite of treatment with powdered sulphur, turpentine essence, balsam of Peru or tincture of *Acorus calamus* (sweet flag). It has been proved that *P. capitis* will feed on guinea-pigs and white mice; similarly in experiments with *P. humanus*, three out of five individuals fed when placed on a dog, two out of four on a cat, and one out of five on a rabbit. None fed on frogs, chickens or pigeons. Starving lice were used in all experiments. The use of skim milk and melted butter by Rumanian shepherds to keep their clothing free from lice suggested experiments with various greasy substances including olive oil, vaseline and petroleum; these showed that the eggs may thus be prevented from sticking to the threads of material, while in addition the larvae are asphyxiated before hatching, and the adults may, after a time, be affected in the same way.

Only one variety of body louse can be recognised. The differences in colour between individuals are due to age, and whether the insect has fed recently; those in the antennae to the fact that the larvae have three joints while the adults have five, while differences in movement have a variety of causes, hungry lice moving towards light, gorged ones away from it.

A single experiment showed that lice can be carried by flies [*Musca domestica*], and that they attach themselves to a suitable host when opportunity arises. There is strong evidence from hospital experience to show that typhus infection is not derived from dust or the débris or dead bodies of lice, but only from the living insects themselves.

Tejera (E.). **La Leishmaniose américaine au Venezuela.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 4, 14th April 1920, pp. 238-240.

An account is given of American leishmaniasis as occurring in certain regions of Venezuela. In the western parts of the Republic this disease is known as Picada de Pito, *i.e.*, the bite of an insect about the nature of which there is some dispute. Out of 62 cases examined nearly all were contracted in the forests; only two cases have been found among inhabitants in the plains at some distance from the woods.

Roubaud (E.). **Nouvelle Contribution à l' Histoire du Ver de Guinée.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 4, 14th April 1920, pp. 254–260.

Recent investigations of the author regarding the infestation of *Cyclops* from the Paris district with the guinea-worm have confirmed the previous findings of Chatton in Tunisia [*R.A.E.*, B, vi, 130, 141].

The embryos of the guinea-worm have shown no trace of development, even after remaining nearly three months in the body-cavity of the Crustacean. A comparison is made between the cycle of development of this parasite and that of certain *Filaria* of the blood, such as *F. bancrofti*, with which there are many points of similarity. The infestation of the intermediate host, whether Copepod or biting insect, is in each case through the digestive tract; the ultimate development takes place after passage into the general body-cavity through the intestinal wall. The emergence of the mature larvae from the intermediate host is made in both cases by breaking the tissues of the host (Dutton membrane of the proboscis of Culicids; body-wall of *Cyclops*). The larvae of these *Filaria* are not inoculated by the intermediate host into the tissues of the ultimate host; they are self-introduced into the latter; through the skin in the case of the blood parasites, through the intestinal wall in the case of *F. medina*. The specific character of the intermediate host, whether *Cyclops* or Culicid, does not influence development except in a secondary manner; exterior climatic and seasonal conditions on the other hand are important among the factors that define the normal endemicity of these parasites.

SENEVET (G.). **Note sur quelques Ixodés parasites des Animaux domestiques recueillis à Mytilène de Février à Juin, 1916.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 4, 14th April 1920, pp. 260–261.

During 1916, the Ixodids collected at Mytilene included *Rhipicephalus sanguineus*, on cattle, donkeys and dogs; *R. bursa*, on cattle and goats; *R. simus*, on cattle and donkeys; *Hyalomma syriacum*, on dogs and a tortoise, *Testudo* sp.; and *H. aegyptium* on cattle.

CANTACUZÈNE (J.). **L'Epidémie de Typhus exanthématique en Roumanie pendant la dernière Guerre.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 4, 14th April 1920, pp. 269–290.

Exanthematous typhus was practically unknown in Rumania before 1916, and relapsing fever did not occur there until 1915. This paper gives an account of the very serious epidemics, particularly of exanthematous typhus, that occurred during the War. Many instances are given confirming the theory that the louse is the only vector of this disease, and its relation to other diseases are discussed. The method of regular disinfestation of the troops is described. The disinfection of clothing was carried out in a specially constructed underground chamber, which is described and illustrated. Brick stoves were set at diagonal corners, the stove-pipe passing horizontally along the chamber and turning upward to the ground level at the other end, thus increasing the surface of radiation of the heat. Wooden beams from which the clothing was suspended crossed the roof. Heat was easily maintained at 212–220°F., and this type of disinfecting oven is considered far more practical and easier to construct than the brick ovens constructed above ground in Serbia. The clothing is left in the oven for an hour, furs also being uninjured by the treatment. It was found possible to treat the clothing of 2,000 men a day by this means.

TEJERA (E.). **Trypanosomiases animales au Venezuela.**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 4, 14th April 1920, pp. 297–305.

There are two forms of trypanosomiasis of equines that have been known for some time in Venezuela, generally in horses but occasionally also in mules and donkeys. The one form is known locally as peste boba, hermosura or tristeza, lasts generally a month or two and ends fatally in more than 80 per cent. of cases. The other is known locally as desrengadera and is practically always fatal. The symptoms of both are described. They are merely two clinical forms of the same disease, probably due to *Trypanosoma evansi,* though the Venezuelan form has been called *T. venezuelense.* The symptoms are very similar to the Argentine disease known as mal de caderas, due to *T. equinum,* though the pathogenic agents concerned are morphologically different; the virulence of *T. venezuelense* is greater, and the disease lasts at the most 2 months; that caused by *T. equinum* lasts from 2 to 5 months. Moreover, *T. venezuelense* is virulent generally at the beginning and end of the rainy season, its maximum occurrence being in March and April. The transmitting agent is not yet known. Tabanids and *Stomoxys* spp. have been examined without any trace of flagellates being found. Mosquitos have been suspected, but have not been examined in sufficient numbers for a decision to be reached. Immense numbers of mosquitos are present in the great plains, which are frequently flooded. Several thousands of horses die annually from the effects of *T. venezuelense.* Experiments to test the virulence of this organism on various animals are described.

During the examination of a cow that was thought to be suffering from piroplasmosis, a trypanosome was discovered that is probably the same as that found in 1919 in French Guiana [*R.A.E.*, B, vii, 137], where some of the cattle are of Venezuelan origin. This is borne out by the fact that inoculations into guinea-pigs and a cat were negative, a result that differentiates this organism, known as *T. guayanense,* from *T. venezuelense,* which is inoculable to all mammals, producing fatal results. The author is inclined to agree with Mesnil in thinking that *T. guayanense* is a variety of *T. cazalboui,* if not identical with it. It is evident that this disease of ruminants has not existed long in Venezuela; it is possible that the zebu, introduced some years ago, brought the form of trypanosomiasis known as souma, which is produced by *T. cazalboui.* The disease is worthy of more extensive study as it threatens to destroy one of the principal sources of wealth in Venezuela.

DE GREEF (G.). **Monographie agricole de la Région de l'Urundi (Ancienne Province de l'Afrique orientale allemande). Chap. vii, Etat Sanitaire des Troupeaux.**—*Bull. Agric. Congo Belge, Brussels,* x, no. 1–4, March–December 1919, pp. 65–69. [Received 19th June 1920.]

The mortality amongst cattle in the Urundi region of ex-German East Africa, now occupied by Belgium, is much higher than it should be, owing largely to the ignorance and carelessness of the native population. The interior of Urundi is naturally preserved by its situation from tsetse-fly and therefore from trypanosomiasis, but on all sides except the north-west the region is surrounded by a plain which constitutes a fly-zone. It is estimated that nearly half the animals destined for public consumption at Kigoma, having traversed this fly-zone, arrive suffering from trypanosomiasis of either of two forms due to *Trypanosoma cazalboui* or *T. congolense.* On the northern side *Glossina morsitans* is abundant and caused considerable loss among cattle in 1917; this is always a danger to the north-east of Urundi also, where conditions are favourable for its existence. The greatest danger however lies in the south, where the geographical distribution of *G. morsitans* is not well known. Along the shores of Lake Tanganyika, *G. fusca*, *G. palpalis* and *G. morsitans* all occur, but as there are but few cattle in this plain, the danger there is not very great. A map of the district shows the distribution of tsetse-fly in the Protectorate of Urundi-Ruanda.

It is estimated also that about one-half the animals exported from Urundi are likely to be suffering from some form of piroplasmosis; *e.g.*, several animals at Gitega have been diagnosed as suffering from African Coast fever. The Watuzi cattle are particularly susceptible to piroplasmosis, for an animal that has acquired a certain local immunity by having recovered from the disease is not resistant to the attacks of ticks from another district. Ticks are responsible for a considerable depreciation in the value of hides from this region, and especially attack the cattle in concentration stations and along the routes to Kigoma. Those most frequently occurring belong to the genera *Rhipicephalus*, *Hyalomma*, *Amblyomma*, *Margaropus* (*Boophilus*), and *Haemaphysalis*, the latter conveying piroplasmosis to dogs.

Skin diseases, such as mange, are fairly common, but a much more serious disease, which has recently been observed in the cattle at Nyanza, is contagious dermatitis due to *Demodex folliculorum* transmitting *Dermatophilus congolense.* The specific treatment for this disease is a 10 per cent. carbolic ointment. Another form of dermatitis, attacking goats and sheep, and always localised about the mouth, nose and occasionally the eyes, which sometimes causes the death of the animal, is thought to be due to the ingestion of plants on which certain insects have deposited a viscous substance.

VAN SACEGHEM (R.). **La Peste du Cheval ou "Horse Sickness" au Congo Belge.**—*Bull. Agric. Congo Belge, Brussels*, x, no. 1–4, March-December, 1919, pp. 162–174, 6 figs. [Received 19th June 1920.]

The information contained in this paper has already been noticed [*R.A.E.*, B, v, 161].

**Matemos la Mosca de Invierno.** [Campaign against *Musca domestica.*] —*Anales Soc. Rural Argentina, Buenos Aires*, liv, no. 9, 15th May 1920, pp. 371–378, 7 figs.

This paper is a popular appeal to the general public of Argentina to assist in the campaign against the house-fly, *Musca domestica.* The dangers of disease carried by the fly are graphically pointed out in tables and charts, and the life-cycle of the insect is described and illustrated. The methods suggested for eliminating the pest include the usual ones for dealing with the breeding-places and for destroying the adults.

SCHAFFER (J. M.). **Saponified Cresol Solutions.**—*U.S. Dept. Agric., Washington, D. C.*, Bull. 855, 6th May 1920, 5 pp.

Experiments are described with saponified cresol solutions made by using soap mixtures composed largely of resin soap. These solutions have at least as great a disinfecting power as those made with linseed-oil soap, and are much cheaper. Solutions containing resin soap appear to have a somewhat higher disinfecting power than those containing only vegetable oil or fish oil. When diluted with water to a 3 per cent. solution they remain clear for varying periods depending upon the amount of resin soap present.

FISHER (L. M.). **What can a Community afford to pay to rid itself of Malaria ?**—*U.S. Public Health Repts., Washington, D. C.*, xxxv, no. 22, 28th May 1920, pp. 1269–1273.

This paper emphasises the economic loss due to malaria [*R.A.E.*, B, vi, 168 ; viii, 64]. If the annual loss due to this disease is calculated and capitalised, a cash expenditure to effect relief is justified as an investment up to an equal amount, less a sum the interest on which will pay the maintenance charges on the permanent work. This point is worked out in detail.

HORNBY (H. E.). **A Contagious Impetigo of Cattle.**—*Vet. Jl., London*, lxxvi, no. 6, June 1920, pp. 210–216, 2 figs.

In this article on contagious impetigo in Africa the author considers the theory that bont ticks [*Amblyomma hebraeum*] account for the spread of the disease difficult to reconcile with the relative positions occupied on the body by these ticks and many of the lesions, unless it is postulated that a virus is introduced into the blood. Propagation from beast to beast takes place through the medium of infected rubbing places, contaminated litter or trek-gear ; possibly, also, through the agency of whips and flies.

PAUER (W.). **Bots in the Oesophagus.**—*Vet. Jl., London*, lxxvi, no. 6, June 1920, p. 223.

A case is recorded in which *post-mortem* examination of a horse showed that the living membrane of the oesophagus four inches from the stomach entrance was packed with bots [*Gastrophilus*]. They extended for about five inches, and were obviously responsible for a difficulty in swallowing noted before death. An intestinal twist which was the actual cause of death seems to have been a coincidence.

DITLEVSEN (C.). **Acarodermatitis e Copra.**—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic*, xx, no. 23, December 1916, pp. 503–511.

This paper reviews recorded cases of copra itch [*R.A.E.*, B, i, 15 ; iv, 46] with notes made during the unloading of three vessels at Copenhagen during 1914–1916, only the stevedores being affected on each occasion. The copra shipments swarmed with a small beetle, *Necrobia rufipes*, which the men erroneously believed to be the cause of the itch. Another beetle, *Silvanus* (*Oryzaephilus*) *surinamensis*, was also noticed, but in very small numbers. The copra dust contained large numbers of dead specimens of the mite, *Tyroglyphus longior*, Gerv., but no living individuals were seen. Experiments showed that dead mites and copra dust containing dead mites are able to cause dermatitis. The greater incidence of this affection in summer may be due to increased perspiration or to the presence of living mites that have survived the voyage owing to the warm weather. Therapeutic measures are superfluous, as the disease disappears when unloading is over ; and prophylactic measures are not warranted, as the trouble is not serious ; individuals that are particularly sensitive to this dermatitis should not be chosen for the work. The men should be warned not to take any copra home. If the copra is shipped in packages much less dust will result.

Another mite, *T. agilis*, Can., was also found, but it is not possible to say what part it plays in causing copra itch.

Fülleborn (F.). **Uber Larbisch und Wolossjatik (Hautmaulwurf).** [Larbish and Wolossjatik (Mole burrowing in the Skin)].—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic*, xxiii, no.13, July 1919, pp. 259–277, 3 figs., 1 plate.

The skin disease known as “ Wolossjatik ” in Russia and called “ Hautmaulwurf ” (mole of the skin) by Samson-Himmelstjerna appears to be caused by larvae of *Gastrophilus* of retarded development and consequent small size—1 mm. long. These larvae wander in the epithelium or in the corneal layer, and as the most superficial grazing of the skin can afford them an entrance, it is immaterial whether they penetrate through wounds or through the unbroken skin. The tropical disease known as “ Larbish ” or “ Oerbiss ” resembles “ Wolossjatik ” in all respects. Roubaud considers that this is not due to insect parasites, and calls it “ pseudo-myiase rampante ” [*R.A.E.*, B, vii, 28]. The author is convinced that in West Africa there is a form of this disease of parasitic origin, probably due to larvae of *Gastrophilus*.

Kleine (F. K.). **Die Schlafkrankheit in Kamerun.** [Sleeping Sickness in Kamerun.]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic*, xxiii, no. 15, July 1919, pp. 315–331, 1 map.

This paper is prepared from an official report dated August 1914, which only reached the German government in 1919 owing to the War. The journey through Kamerun lasted from April to August 1914 and was undertaken in order to ascertain the extent to which the habits of *Glossina* and the local conditions differ from those in East Africa.

The distribution of *Glossina palpalis*, especially on the larger rivers, is described.

All traffic and fishing on the rivers should be forbidden by day, from 6 a.m. to 6 p.m., and should be subject to supervision. Resting by day should be permitted only at cleared stations. In utilising clearing and cultural measures, those applied quite close to native or European settlements are likely to be the most successful. It s unnecessary to remove the roots of large trees that have been felled, but the immediate establishment of cultivated plants is imperative or the clearings will become covered with bush very favourable to *Glossina* ; this has actually occurred in one case.

Among 5,000 individuals examined in the Dume district Dr. Schachtmeyer found 14 per cent. to be infected, and the actual percentage is probably higher owing to the authorities not having secured the full confidence of the natives.

It had been previously stated that in New Kamerun the high sickness figures had no relation to the few *Glossina* present. The author did not observe such a discrepancy. It is true that on the Carnot-Kumbe road no *G. palpalis* is found close to the villages, whilst from 6 per cent. to 52 per cent. of the population is infected ; but at a distance of one day's march east and west of the road there are rivers heavily infested with this fly, and there is a constant inter-communication between the natives.

*G. fusca* is also fairly frequently met with. At Kumbe Dr. Fischer captured 1,011 specimens of *G. fusca* in 4 weeks and fed them on a species of *Cercopithecus.* Though none of these monkeys contracted sleeping sickness, the author does not doubt that *G. fusca* is capable of transmitting it.

WEINBERG (M.). **Pappatacifieber und Influenza.** [Pappataci Fever and Influenza.]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic,* xxiii, no. 15, July 1919, pp. 331–37.

This paper compares the clinical symptoms of sandfly fever, which is conveyed by *Phlebotomus,* and influenza.

FÜLLEBORN (F.). **Ueber Ophthalmomyiasis und einen solchen Fall aus Nord Frankreich.** [Ocular Myiasis and Notes on a Case from Northern France.]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic,* xxiii, no. 16, August 1919, pp. 349–359, 3 figs.

Numerous references are given to the literature on ocular myiasis. Of the 40–50 cases recorded in detail the majority appear to be due to larvae of *Rhinoestrus purpureus* or allied flies, even where those of *Oestrus ovis* have been thought to be involved. The "Thim'ni" ocular myiasis described by the brothers Sergent from Algeria and the Sahara and held by them to be due to *O. ovis,* is considered to be better ascribed to *Rhinoestrus* in view of the biology and distribution of these flies ; this affection has only been observed in the distributional area of *R. purpureus* (*nasalis*).

A record is given of what the author believes to be the only fully authenticated case of human ocular myiasis from France. It is believed to have been due to *R. purpureus.*

DU TOIT (P. J.). **Experimentelle Studien über die Pferdepiroplasmose. III. Mitteilung. Uebertragungsversuche mit Zecken bei der** *Piroplasma-caballi*—**Infektion.** [Experimental Studies on Equine Piroplasmosis. Third Communication. Experiments in the Transmission of *Piroplasma caballi* by Ticks.]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic,* xxiii, no. 16, August 1919, pp. 359–368, 1 fig.

The two preceding papers have already been noticed [*R.A.E.*, B, viii, 45, 46]. The experiments described here aimed at ascertaining whether the tick, *Ixodes ricinus*, L., could transmit *Piroplasma caballi* in Germany. As specimens of *Dermacentor reticulatus*, F., universally held to transmit *P. caballi*, were available, experiments were also made with this species.

All experiments with *I. ricinus* proved negative, and this tick seems incapable of carrying *P. caballi.* These results and those given in the second communication (with *Nuttallia equi*) show that there is little danger of equine piroplasmosis becoming established in Germany.

The tests with *D. reticulatus* proved positive, thus confirming this tick as the carrier of *P. caballi.* The ticks can become infected in the larval stage and in that case they are not only infective in the nymphal stage, but the act of transmitting infection does not cleanse them and the adults are also infective. Infected ticks can therefore transmit the disease in two consecutive stages without ingesting infected blood in the interval. This behaviour has not been observed before in the case of the IXODINAE.

PLEHN (A.). **Zur Epidemiologie der Malaria.** [The Epidemiology of Malaria.]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic*, xxiii, no. 17, September 1919, pp. 371–386, 2 diagrams.

The contents of this paper are indicated by its title. It is pointed out that many difficulties hamper a study of the distribution of malaria infections throughout the year and their relation to the different seasons, and that these difficulties were not solved at the time that the rôle played by Anophelines was discovered.

SCHILLING (V.). **Uber die schwere cilicische Malaria.** [Notes on the severe Cilician Malaria.]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic*, xxiii, no. 20–21, November 1919, pp. 475–498, 1 map, 3 charts.

In the Taurus and Amanus regions of Cilicia malaria in a severe endemic form was observed in 1916. This paper deals mainly with the medical aspect of the question. It is stated that during the summer of 1916 *Culex* and *Stegomyia*, both cistern and well breeders, were found at Aleppo, but no *Anopheles* were noticed.

SWELLENGREBEL (N. H.) & SWELLENGREBEL-DE GRAAF (J. M. H.). **Lijst van Anophelinen uit het Oosten van den Archipel, met nadere Beschrijving van de voor Ned.-Indië nieuwe Vormen.** [A List of Anophelines from the East of the Malay Archipelago, with a fuller Description of the Forms new to the Dutch East Indies.]—Reprint from *Geneesk. Tijdschr. Ned.-Indië, Batavia*, lx, no. 1, 1920, 18 pp., 3 plates, 1 map.

The area dealt with, extending from west to east, includes Celebes, the island south of Celebes, and the Moluccas (including western New Guinea).

The species found were :—*Anopheles hyrcanus* (*sinensis*). *A. barbirostris, A. indefinitus, A. subpictus* (*rossi*), *A. ludlowi, A. leucosphyrus, A. punctulatus, A. barbirostris* var. *pallidus, A. annulipes* var. *moluccensis, A. punctulatus* var. *orientalis, A. aitkeni* var. *insulae-florum,* *A.* (*S.*) *aitkeni* var. *papuae* [*R.A.E.*, B. viii, 136]. The four last-named are new forms of which illustrated descriptions are given.

*A. annulipes* var. *moluccensis* is the most ubiquitous species in the Dutch East Indies; it occurs in both fresh and salt water to a greater extent than other Anopheline larvae. *A. punctulatus* var. *orientalis* breeds in the forests, in fresh-water pools and rivulets. In the eastern portion of the area under consideration it has almost displaced the typical form. *A. aitkeni* var. *insulae-florum* breeds in slow-flowing or standing clear water in the woods in Ambon, one of the Moluccas. *A. aitkeni* var. *papuae* was found only in New Guinea, in slow-flowing forest rivulets.

The distribution of these species is shown on a map, and it would appear that the Australian Anopheline fauna is not limited by the Wallace line (Straits of Lombok—Straits of Macassar), but by a line eastwards of Celebes. The point at which this line crosses the chain of the lesser Sunda Islands is not known.

The breeding places in the Archipelago eastwards of Celebes are shown in a table. A second table covers the breeding places in Celebes and Boeton, and a third shows the relation between enlarged spleen and Anopheline occurrence. It appears from the latter that localities where there are breeding places of *A. ludlowi* and *A. subpictus* (*rossi*) usually have a high spleen index.

Schüffner (W.) & Swellengrebel (N. H.). **Handleiding voor het Epidemiologisch Malaria-Onderzoek.** [A Manual for Malaria Investigation.]—Hoofdbureau van der Burgerlijken Geneeskundigen Dienst, *Weltevreden*, 1918, x+67 pp., 27 plates, 9 charts. [Received 19th June 1920.]

This fully illustrated pocket manual is intended for officials of the Dutch East Indian Civil Medical Service, and gives instructions regarding topographical, clinical and entomological investigations. The last-named section deals with methods of capturing and determining Anopheline larvae and adults and of ascertaining the presence of malaria parasites in the adult mosquito.

Keys to both sexes of the adults and to the larvae are given.

Crimi (P.). **Sulla Terapia della Rogna sarcoptica degli Equini e su di un Metodo curativo efficace, rapido e semplice.** [The Therapy of Sarcoptic Mange of Equines and an efficacious, rapid and simple Method of Cure.]—*Ann. Staz. Speriment. Malattie Infettive del Bestiame, Portici*, v (1918), no. 1, 1919, pp. 19–71. [Received 23rd June 1920.]

The following method of treating sarcoptic mange on equines is recommended. The animals are clipped, washed with soft-soap containing 4 per cent. of creolin, and then rubbed with an ointment composed of flowers of sulphur 25, tobacco extract (Italian government brand), 5 and vaseline 100, all parts by weight. The application is made on one side of the animal, the other side being treated on the following day. Two days after this second application the animal is washed with ordinary soap and hot water.

Laveran (A.) & Franchini (G.). *Herpetomonas* **et** *Spirochaeta* **de la Blatte orientale.**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 5, 12th May 1920, pp. 331–333.

Since the previous paper was published [*R.A.E.*, B., viii, 88] cockroaches, *Blatta* (*Periplaneta*) *orientalis,* collected in Paris and the environs have been examined, and although the flagellates, *Herpetomonas periplanetae,* were present in small numbers, spirochaetes, *Gregarina blattarum,* and other organisms were more frequently found.

These included *Spirochaeta periplanetae,* sp. n., which is here described. Observations made with this organism indicate the possibility of hereditary infection. Of five white mice inoculated with the contents of the digestive tube of *Periplaneta orientalis* infected with *S. periplanetae,* one died 24 hours and another 48 hours after inoculation, two became infected and the fifth apparently escaped infection. Individuals of *Blattella* (*Phyllodromia*) *germanica* were also examined, but neither *Herpetomonas* nor spirochaetes were found.

Jamot (E.). **Essai de Prophylaxie médicale de la Maladie du Sommeil dans l'Oubangui-Chari.**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 5, 12th May 1920, pp. 343–376.

The prophylactic measures against sleeping sickness organised by the Governor General in the French Congo during 1916 are discussed, mainly from the medical aspect. The infected area was divided up into sections, and this paper deals chiefly with the district of Ubangi-Shari.

*Glossina morsitans* is apparently not responsible for the propagation of sleeping sickness in this district, there being but few places where this fly is very numerous. *G. fusca* and *G. tachinoides* are most abundant along the small rivers, the banks of which are covered with timber.

The distribution of *Glossina palpalis* is very irregular. In general the disease is less serious in the regions where the fly is rare or entirely absent, though no precise correlation can be found between the incidence of the disease and the density of the fly.

Piot (A.). **Sur le Fonctionnement d'un Secteur de Prophylaxie contre la Trypanosomiase au Congo français (1919).**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 5, 12th May 1920, pp. 376–384, 1 map.

The medical prophylaxis carried out in the Ibenga-Motaba section of the French Congo is described. The distribution of *Glossina* is very similar to that recorded in the preceding paper. The flies are most abundant about the middle third of the course of the rivers Ibenga and Motaba and disappear completely along their upper courses. Tsetse-flies were absent in the villages and adjoining forests lying on the same level as the upper water of these rivers. Mosquitos were also absent at this level, but were abundant in the lower villages.

Marchand (W.). **Thermotropism in Insects.**—*Entom. News, Philadelphia,* xxxi, no. 6, June 1920, pp. 159–165.

Among a number of examples of the reaction of insects to heat, the most characteristic instance of thermotropism, affecting the blood-sucking instinct of mosquitos, has already been noticed [*R.A.E.*, B, vii, 63]. Concerning other blood-sucking insects, the hog louse, *Haematopinus suis*, failed to give a thermotropic reaction, but this is not astonishing since these parasites live permanently on their host, and, being wingless, would hardly be able to find their host by means of a tropism.

NEWCOMB (C.). **On an Outbreak of Relapsing Fever in Turkey in 1918.**—*Indian Med. Gaz., Calcutta*, lv, no. 6, June 1920, pp. 208–217.

The outbreak of recurrent fever in Turkey, which made its appearance in April 1918 and continued until June, was undoubtedly due to lice. The literature on relation of this disease to lice and other insects is reviewed.

FACER (A. W.). **Hints on Dips and Dip-Testing.**—*Rhodesia Agric. Jl., Salisbury*, xvii, no. 3, June 1920, pp. 255–261.

Dipping is a convenient method of poisoning ticks with arsenic, and the effective and safe solutions for dipping at different intervals are :—0·08 per cent. arsenious oxide for 3-day dipping ; 0·16 per cent. for 7-day dipping ; 0·24 per cent. for 14-day dipping. Solutions that are much weaker than the above for the prescribed intervals do not kill the ticks ; solutions that are much stronger for the prescribed intervals are dangerous, in that the cattle may be scalded in passing through them, perhaps with fatal results.

In testing dips the object is to find the percentage of arsenious oxide in the tank fluid, which in practice contains water, dirt, soda, arsenious oxide, and various other substances added to render the fluid bitter to the taste, etc. Arsenious oxide possesses the property of absorbing iodine in a certain definite proportion (2 oz. absorb about 5 oz.). The arsenious oxide in dips can therefore be found by testing a measured quantity of it with a " testing solution " of iodine of a definite strength. As the soda would interfere, it is removed by adding sulphuric acid (about 30 drops per bottle). When enough acid has been added the sediment usually settles, and the clear liquid can be poured off, or if necessary it can be filtered. Exactly 50 c.c. of this liquid is measured off. The acid it contains is counteracted by adding sodium bi-carbonate until there is no further effervescence. A little Gloy is then added. Gloy contains dissolved starch, which gives a blue colour with the slightest trace of " free iodine." The dipping fluid is now ready for testing. The iodine solution is placed in a burette, so that the amount used can be measured, and gradually introduced into the beaker containing the fluid, the latter being thoroughly and constantly shaken during the process.

As the addition of the iodine proceeds the blue colour appears, but rapidly disappears on shaking. After a time it disappears much more slowly, and the iodine should then be introduced only a very little at a time until the blue colour persists when the fluid is thoroughly shaken. The number of cubic centimetres absorbed by the dip is then read from the burette. By dividing this number by 100 (when exactly 50 c.c. of dip have been taken for the test) the amount per cent. of arsenious oxide in the dipping fluid is found.

Under certain circumstances the arsenious oxide in the arsenite of dips tends to change into another form producing arsenate [*R.A.E.*, B, viii, 6, etc.]. This has about half the tick-killing power of arsenite, has a scalding and poisoning effect on cattle, and is not apparent in the test described. The proportion of arsenate tends to increase in a tank that has stood unused for some time.

HINE (J. S.). **Descriptions of Horseflies from Middle America. I.**—*Ohio Jl. Sci., Columbus*, xx, no. 6, April 1920, pp. 185–192. [Received 7th July 1920.]

The following new Tabanids are described:—*Tabanus fulmineus* and *T. festivus*, from the Canal Zone; *T. murreus, T. modicus* and *T. tantalus*, from British Guiana; *T. umbratus* and *T. validus*, from Costa Rica; *T. mordax*, from Paraguay; *T. furvus* from Bolivia; *T. curtus* from Venezuela; *T. bruesi, T. lautus* and *T. punensis*, from Peru; *T. tacitus* from Uruguay. *T. trivittatus*, F., from British Guiana is redescribed. These are all placed in the genus *Tabanus* (*sens. lat.*) to avoid the erection of a number of new genera, a procedure that is considered undesirable at present. A key to the new species is also given.

It is proposed to substitute *Stichocera*, n. n., for *Dicrania* and *Dicranomyia*, both of which have been used for the same genus and are preoccupied.

EDWARDS (F. W.). **The Nomenclature of the Parts of the Male Hypopygium of Diptera Nematocera, with special reference to Mosquitos.**—*Ann. Trop. Med. Parasit., Liverpool*, xiv, no. 1, 30th June 1920, pp. 23–40, 2 figs.

The contents of this paper are sufficiently indicated by the title.

MACFIE (J. W. S.). **Heat and *Stegomyia fasciata*: Short Exposures to raised Temperatures.**—*Ann. Trop. Med. Parasit., Liverpool*, xiv. no. 1, 30th June 1920, pp. 73–82.

As a result of these experiments it was found that the ability of *Stegomyia fasciata* to withstand sudden exposure for five minutes to a raised temperature is greatest in the egg-stage, slightly less in the pupal stage, and least in the larval and adult stages. It was also found that the effect of heat varied greatly as a result of the manner in which it was applied, the length of time occupied in reaching the particular temperature, and the length of time that temperature was maintained. During the observations here described only exposures of 5 minutes were studied.

Adult mosquitos are apparently more susceptible to the action of a raised temperature in the absence of moisture.

BLACKLOCK (B.) & CARTER (H. F.).—**On the Results obtained from Surveys for Breeding-Places of Tree-Hole Mosquitoes in Liverpool and Neighbourhood.**—*Ann. Trop. Med. Parasit., Liverpool*, xiv, no. 1, 30th June 1920, pp. 115–126, 1 fig., 1 plate.

The results of a survey to determine the frequency with which breeding places of *Anopheles plumbeus*, Steph., occur in trees are summarised by the authors as follows:—In a series of 6 surveys, 5 in the Liverpool district and 1 in Delamere Forest, Cheshire, 2,500 trees were examined up to a height of 25 feet for breeding-places of *Anopheles plumbeus* and *Ochlerotatus geniculatus*. A total of 83 holes and 51 forks and clefts containing water were found; 16 breeding-places of *A. plumbeus* and 19 of *O. geniculatus* were discovered; larvae of *A. plumbeus* and *O. geniculatus* were associated on 13 occasions. Breeding-places of *A. plumbeus* occurred in 0·64 per cent. of the trees examined and in 19·2 per cent. of holes containing water.

Up to a height of 6 feet from the ground, 39 places containing water, 4 breeding-places of *A. plumbeus* and 6 of *O. geniculatus* were found; above 6 feet, 95 places containing water, 12 breeding-places of *A. plumbeus* and 13 of *O. geniculatus* were found.

Elms, horse-chestnuts and sycamores provided the great majority of the breeding-places; oaks, Spanish chestnuts and firs provided no breeding-places and very few holes containing water.

MERILLAT (L. A.). **Fly Repellent.**—*Amer. Jl. Vet. Med., Chicago,* xv, no. 7, July 1920, p. 333.

The following mixture is advocated as a fly repellent during surgical operations and in the treatment of sick animals worried by flies:—1 lb. of common laundry soap boiled in 4 U.S. gals. of water until dissolved and then mixed with 4 oz. of naphthaline dissolved in 1 U.S. gal. of crude petroleum. This is best applied with a brush or sponged over the hair with a sponge or cloth.

HARRISON (W. T.). **Plague in California Ground Squirrels.**—*Mthly. Bull. Cal. State Dept. Agric., Sacramento,* ix, no. 5–6, May-June 1920, pp. 187–194.

Plague was first discovered in California in 1900, and the first epidemic of pneumonic plague to occur in the Western hemisphere broke out in Oakland in September 1919, as the result of one of the inhabitants shooting squirrels in the neighbouring hills and bringing them home and preparing them for food. The epidemic resulted in the death of 14 persons. The Public Health Service has maintained eradication measures against ground squirrels since 1908, their extent being limited by the appropriation allowed. The chief reason why so few cases of plague have been contracted from ground squirrels is that where squirrels are plentiful there are usually few inhabitants. It is not possible to estimate how complete squirrel destruction must be in order to eradicate plague; in cities 75 per cent. destruction of rats causes plague to disappear, but this does not seem to hold good for squirrels. Whether re-infection from surrounding areas takes place or whether infection persists in a chronic form in a few squirrels has not been determined. Plague is most acute among the young squirrels in the early spring and summer months, becoming more chronic as they become more vigorous. Many carloads of carbon bisulphide and many tons of poisoned barley have been used in California during the past year, but much continuous work must be done before squirrels cease to be a menace.

It is stated that the rat flea [*Xenopsylla cheopis*] remains infective for human beings for 30 days or more, and that ordinances in San Francisco are enforcing that all new buildings should be rat-proof in construction.

LOFTIN (U. C.). **Mosquitoes found about Gainesville, Fla. Part II. – Traps for Mosquitoes.**—*Florida Buggist, Gainesville*, iii, no. 4, March 1920, pp. 53–59 & 67–71, 3 figs. [Received 14th July 1920.]

The two previous instalments of this paper have already been noticed [*R.A.E.*, B. viii, 58, 94]. In this part are recorded the results of experiments with mosquito traps consisting of jars or boxes coloured black inside or lined with dark cloth. They should be rather narrow and deep, and should be placed in a well lighted room or porch which is free from dark cupboards, etc. The mosquitos gather in them in the early morning for shelter during the day, and the tops should be closed before the sun shines directly on them.

The greatest numbers were caught on warm, still nights. Baits did not add to the attractiveness of the traps, and not all species were equally attracted ; *Culex fatigans* (*quinquefasciatus*) made up over 98 per cent. of the total, Anophelines came next, and only two or three *Stegomyia* and *Psorophora* were taken. The percentage of *C. fatigans* is probably higher than is usually found outside the traps.

These traps are not recommended to rid a place of mosquitos, but if used with judgment will reduce their numbers. Such traps are also useful for collecting specimens for demonstrations, tests or other purposes. They were also used for testing repellants, one trap being treated with a little of the substance, and another about a foot away used as a control. The percentage of efficiency of Bombay Vapor, oil of citronella and oil of tar varied from 92·8 per cent. to 82 per cent. in the order named.

PIERCE (W. D.). HUTCHISON (R. H.) & MOSCOWITZ (A.). **Government Report on Laundry Machinery. Its Adaptability to various Requirements of Disinfection and Disinsection.**—*National Laundry Jl., Chicago*, lxxxi, no. 1, 1st January, 1919, pp. 4–14. [Received 14th July 1920.]

The technique employed in obtaining eggs and individuals of *Pediculis humanus* var. *corporis* (*vestimenti*) for these experiments is described, as well as the process of washing and the various observations made on the effects of different temperatures, live steam, insecticidal soap, etc., on lice.

The results show that the modern laundry as now adopted for army camps is a thoroughly adequate method of disinfection. A temperature from 140° F. to 158° F., if maintained in a closed vessel for twenty minutes, is sufficient to destroy all pathogenic non-spore-bearing forms of bacteria ; 131° F. will kill lice, and this temperature may be used for woollen materials without causing undue shrinkage. The measures advocated for sterilising woollens are washing for 15 minutes in heavy suds at a temperature of 131° F., followed by 3 rinsings of 3 minutes each at the same temperature ; the garments are then placed in a drying tumbler for 15 minutes at a minimum temperature of 140° F.

RAND (F. V.) & PIERCE (W. D.). **A Co-ördination of our Knowledge of Insect Transmission in Plant and Animal Diseases.**—*Phytopathology, Baltimore*, x, no. 4, April 1920, pp. 189–231. [Received 14th July 1920.]

This paper reviews present knowledge with regard to insect transmission of plant and animal diseases, and emphasises the importance in future studies of collaboration between pathologist and entomologist.

PIERCE (W. D.). **Some Necessary Steps in any Attempt to prove Insect Transmission or Causation of Disease.**—*Science, Lancaster Pa.*, N.S., l, no. 1284, 8th August 1919, pp. 125–130. [Received 14th July 1920.]

In an investigation of the question of the transmission of a disease by invertebrate carriers, the importance of co-operation between physician, parasitologist and entomologist is emphasised. Details are given of the various ways in which an insect or other blood sucker can be involved in disease transmission. The information that should be collected about the disease to be investigated and the possible insect carriers are indicated, and the questions to which transmission experiments must provide a reply are detailed. Hints are given on the handling of experimental insects, and on recording observations.

AWATI (P. R.). **Bionomics of Houseflies: I—Outdoor Feeding Habits of Houseflies with Special Reference to** *Musca promisca* (*angustifrons* ?).—*Indian Jl. Med. Res., Calcutta*, vii, no. 3, January 1920, pp. 548–552. [Received 16th July 1920.]

The species of *Musca* may be divided into two groups:—haematophagous species, such as *M. bezzii*, usually found associated with cattle, and species that frequent houses and are more or less associated with man. The chief aim of this paper is to find which of the species of the second group are intimately connected with fresh human faeces, so far as feeding is concerned. Since fresh faeces are usually found infected during epidemics of cholera, typhoid, etc., and are often easily accessible to house-flies, it is important to know which species of *Musca* are first attracted to feed on them.

The results of a number of observations, which are described, made in different situations and under varying weather conditions in different seasons of the year, showed that *Musca divaricata* (*nebulo* ?) was most abundantly found in dwelling houses, sweetmeat shops, hotels, on stale human faeces and on human faeces mixed with other matter; while *M. promisca* (*angustifrons* ?) was mostly attracted to fresh human faeces. *M. promisca* was also found in sweetmeat shops, etc., though in comparatively small numbers.

AWATI (P. R.). **Bionomics of Houseflies: II—Attraction of Houseflies to Different Colours.**—*Indian Jl. Med. Res., Calcutta*, vii, no. 3, January 1920, pp. 553–559. [Received 16th July 1920.]

This paper describes two series of experiments which seem to show that, contrary to the statements of certain writers (*e.g.*, *R.A.E.*, B, vii, 56), various colours do have different degrees of attraction for houseflies. The first series was carried out at night, when artificial lights were exposed. The second was performed by day with differently coloured tanglefoot papers.

Yellow had the greatest attraction, red and violet the least; blue, green and orange were intermediate. There was no evidence that the sexes differed in their response to various colours, and the response was identical by day and night. Flies other than *Musca* were few; but *Calliphora* spp. showed colour-preferences similar to those of house-flies.

AWATI (P. R.) & SWAMINATH (C. S.). **Bionomics of Houseflies: III—A Preliminary Note on the Attraction of Houseflies to certain Fermenting and Putrefying Substances.**—*Indian Jl. Med. Res., Calcutta*, vii, no. 3, January 1920, pp. 560–567. [Received 16th July 1920.]

In these experiments certain substances were allowed to ferment or putrefy, and were tested chemically from day to day. It was observed that house-flies (*Musca divaricata* and *M. promisca*) began to be attracted to a particular substance after it had undergone a certain degree of chemical change; the number of flies attracted reached its maximum at a certain stage of the process, after which it began to fall, till at last the substance had no attraction. The substances used were rice, wheat, pulses, egg, meat and fish.

Tables are given of the results of all the experiments. The first two substances did not attract very many flies. The pulse attracted more, possibly because of the presence of putrescible components; but the egg, meat and fish attracted much the largest number. As a result it seems that some strong smelling substances connected with putrefaction such as ammonia, sulphuretted hydrogen, some organic compounds of phosphorus, etc., may be necessary to attract flies before they approach what is otherwise a satisfactory food. Akalinity or acidity of a fermenting or putrefying mixture has nothing to do with attraction of flies.

The flies in question did not oviposit in any of the substances.

SENIOR-WHITE (R. A.). **On the Occurrence of Coleoptera in the Human Intestine.**—*Indian Jl. Med. Res., Calcutta*, vii, no. 3, January 1920, pp. 568–569, 1 plate. [Received 16th July 1920.]

A pathological condition caused by the presence of the Scarabaeid beetle, *Onthophagus bifasciatus*, F., in the human intestine is recorded. The disease appears to be confined almost entirely to children of from three to eight years old, and to occur only in the low country of Ceylon. It occurs both in Sinhalese and Tamil children.

It is probable that whilst in the intestine the larvae are faecal feeders but how and at what stage they get there, and how they remain unpassed during the larval and pupal stages is unknown. The adults are passed and escape; in the case noticed here the individuals passed were all females.

Though seldom or never serious, these cases are sufficiently common to have a definite vernacular name. Possibly infection take place through ova or young larvae in one or other of the semi-decayed forms of dried fish that form a regular article of diet with both the Sinhalese villager and the Tamil estate coolie.

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**Gill (C. A.). Note regarding Malaria in Kashmir.**—*Indian Jl. Med. Res., Calcutta,* vi, no. 3, January 1920, pp. 610–617. [Received 16th July 1920.]

The reasons for the freedom of the Kashmir valley from malaria are considered. *Anopheles willmori*—a proved carrier of malaria—was distinctly abundant in places and bit freely in September 1919. Other Anophelines included *A. plumbeus* (*barianensis*) [*cf. R.A.E.*, B, i, 142] *A. lindesayi,* and *A. gigas.*

In 1919 therefore the factors favourable to the occurrence of malaria were :—the Anopheline factor ; the human factor, Kashmiris being suspectible in the Punjab, while numbers of malarious subjects, both British and Indian, visit Kashmir annually ; climatic conditions, the summer being rather hotter than the average English one, and the rainfall being the same as in many parts of the Punjab plains, and evidently producing conditions favourable to insect life. The only unfavourable factor seems to be altitude. The floor of the Kashmir valley is elevated between 5,000–6,000 feet above sea-level ; mountainous regions are generally stated to be free from malaria, though apparent exceptions to this rule have been reported. A table of the incidence of malaria at various heights in the Punjab shows it to be absent in localities having an altitude of 6,000 feet or over, in spite of the presence of malaria-carrying Anophelines. The critical altitude would appear to be between 5,000–6,000 feet—the average height of the Kashmir valley. Consequently the apparent freedom of Kashmir from malaria must be ascribed in some way to its altitude. The exact significance of altitude in relation to malaria has not been studied, and it is proposed in a future communication to endeavour to throw more light on the subject, which may prove to be of more than academic interest.

**Gill (C. A.). The Relationship of Malaria and Rainfall.**—*Indian Jl.* Med. Res., Calcutta, vii, no. 3, January 1920, pp. 618–632. [Received 16th July 1920.]

Whilst in all malarious countries there is a general association between rainfall and malaria, no constant relationship exists between excessive rainfall and the incidence of autumnal malaria. In the city of Amritsar an excess of rainfall is apt to be associated with great epidemics that occur abruptly in the last week in September, reach their maximum in the first half of October, and thereafter decline with moderate rapidity.

The correlation between the July-September rainfall and autumnal malaria is high, but for the production of epidemic malaria the July-August rainfall is of paramount importance. The effect on malaria of rainfall in the other nine months is inappreciable. Infection is most likely to occur between early July and the end of October, the first two months being more important. Besides rainfall, economic conditions, and, possibly, other factors, are capable of influencing the occurrence of epidemic malaria.

As the data regarding rainfall and the economic conditions concerned in the production of malaria epidemics in the Punjab are available each year at the end of August, it will be possible to forecast these epidemics with considerable accuracy about three weeks before their commencement. Such a forecast would, however, be wholly inaccurate in the case, for example, of Bombay, where similar rainfall and economic conditions have never given rise to great epidemics.

Cragg (F. W.). **Secretion and Epithelial Regeneration in the Mid-Intestine of *Tabanus*.**—*Indian Jl. Med. Res., Calcutta*, vii, no. 3, January 1920, pp. 648–663, 3 plates, 1 fig. [Received 16th July 1920.]

A full account is given of the processes of digestion in *Tabanus*, of the secretions of the cardia and stomach, and of the regeneration of the epithelium. As regards absorption of the digested food, this passes through the cytoplasm of the cells of the stomach without assuming a concrete form, and there is nothing resembling the complex phenomena that have been described in connection with absorption in the ticks.

In view of the general similarity of their structure and habits, it is probable that processes similar to those described in *Tabanus* also occur in the mosquito.

Bishopp (F. C.). **Thoughts on Insects in Relation to Production of Live Stock and Poultry.**—*Jl. Amer. Vet. Med. Assoc., Washington, D.C.*, lvii, N.S., x, no. 4, July 1920, pp. 414–422.

The variety of ways in which insects affect live-stock and poultry are discussed. These include direct attack, such as injury by biting flies, etc., as well as the transmission of disease by ticks and insects.

The necessity for careful work to ascertain the effect of various insects on the health, growth and production of animals, in order to determine the importance of carrying out remedial measures, is emphasised. This would be greatly facilitated by the co-operation of the veterinary entomologist and animal husbandman.

Smith (E. I.). **Tick Eradication in the South.**—*Jl. Amer. Vet. Med. Assoc., Washington, D.C.*, lvii, new Ser. x, no. 4, July 1920, pp. 423–429.

The history of tick eradication in the southern United States from 1905 to 1919 is briefly reviewed, and its general success is emphasised. Up to 1st December 1918, 63 per cent. of the territory originally quarantined had been released. The intrinsic value of cattle is estimated to have increased from 20 to 100 per cent. and that of land from 25 to 100 per cent.

Swellengrebel (N. H.) & Swellengrebel de Graaf (J. M. H.). **Lijst der in Nederlandsch Indië gevonden Anophelinen.** [A List of Anophelines found in the Dutch East Indies.]—*Tijdschr. Entom., The Hague*, lxiii, no. 1–2, 15th July 1920, pp. 96–108.

The mosquitos in this list have already been dealt with [*R.A.E.*, B, vii, 183; viii, 136]. Their geographical and seasonal distribution and pathogenicity are briefly noted.

Pennington (M. S.). **Notas sobre un Caso de la Enfermedad llamada "Ura," causada por la Larva de la *Dermatobia cyaniventris*, Macq.** [Notes on a case of "Ura", caused by the Larva of *D. cyaniventris*.]—*Physis, Buenos Aires*, iv, no. 18, 31st December 1919, pp. 577–578, 2 figs. [Received 19th July 1920.]

A case is recorded of infestation by the larvae of *Dermatobia cyaniventris*, Macq., in an individual who had just returned to Buenos Aires after a journey through Misiones and Alto Paraná. These larvae had punctured the skin in five places and embedded themselves in the flesh beneath, and were extracted with great difficulty.

Lischetti (A. B.). **Algunas Observaciones sobre la Morfologia de los Huevos de *Culex*.** [Some Observations on the Morphology of the Eggs of *Culex*.]—*Physis, Buenos Aires*, iv, no. 18, 31st December 1919, pp. 588–591. [Received 19th July 1920.]

The "float" or hydrostatic apparatus that is appended to each egg of *Culex* spp. and that enables the egg-mass to float like a raft on the surface of water is described and illustrated. The joint action of all the floats forming a raft gives such stability to the egg-mass that it is almost impossible to submerge it. Even if this is done mechanically, a small volume of air is retained between the base of the eggs and the floats, which enables the whole mass to rise again to the surface immediately the pressure is removed.

Lischetti (A. B.). **Un Verme del Genero *Planaria*, Enemigo natural de las Larvas del Mosquito.** [A Worm of the Genus *Planaria* as a Natural Enemy of Mosquito Larvae.]—*Physis, Buenos Aires*, iv, no. 18, 31st December 1919, pp. 591–595. [Received 19th July 1920.]

The fact that 30 larvae of *Stegomyia fasciata* (*Aëdes calopus*), placed in a glass tank of water for breeding purposes, disappeared within two days led to investigations to determine the reason. Thirty larvae of *Culex* sp. introduced into the tank suffered the same fate, only a few fragments being left. An examination of the flora and fauna of the water was then made, and revealed among other things a number of worms of the genus *Planaria*. The fact that young mosquito larvae disappeared completely and that only the harder portions of older ones were left, indicated that they were devoured by the *Planaria*, which was the only living organism in the water capable of such action. Experiments were then made with 100 c.c. drinking water into which were placed 6 *Planaria* worms, and, in successive batches of about 10 to 20, 108 larvae of *Culex* spp. from 3 to 4 mm. long. A table shows the length of time taken to dispose of the various batches of larvae; within 4 hours the 6 *Planaria* had devoured a total of 106 larvae, only 2 particularly large individuals escaping the general fate. The same 6 *Planaria* were immediately transferred to another vessel containing 200 *Culex* larvae of 4 to 5 mm. length, which they immediately attacked and continued devouring with short intervals of rest. By midnight many larvae were dead or dying and by 8 a.m. next day all had either disappeared or were clinging to the bottom or sides of the receptacle.

The habits of these worms have been studied, and are described. The presence of mosquito larvae in the vicinity causes some excitement among them, and the larvae are attacked when their siphons are brought to the surface of the water for respiration and the larvae are motionless for a few seconds. The worm applies one of the lateral lobes of its head to the siphon of the larva, to which it adheres by means of the viscous substance with which it is covered; if the larva tries by means of its mouth-parts to rid itself of its enemy, as is frequently the case, both mouth-parts and siphon adhere to the worm, which, as soon as it has secured its prey, drops with it to the bottom of the receptacle. It then punctures one of the larval segments and drags out the whole body content of the larva, leaving only the head and skin. Adult larvae, on account of their strength, and pupae on account of their activity, can almost always escape the attacks of *Planaria.*

The experiments described indicate that this natural enemy might be used artificially for the destruction of mosquito larvae, but further information must be obtained regarding the distribution and habits of the worm, its resistance to meteorological conditions, etc., before its value in this connection can be determined. The present notes ar given with the object of interesting students in the question and suggesting a field of investigation to them.

RENTOUL (A. V. D.) & CLINTON (H. F.). **Poultry Parasites.**—*Jl. Dept. Agric. Victoria, Melbourne,* xviii, no. 5, May 1920, pp. 302–306, 3 figs.

The external parasites of domestic fowls that are most frequently met with are discussed. The species dealt with include the red mite, *Dermanyssus gallinae*; scaly leg mite, *Sarcoptes mutans*; the depluming mite, *Sarcoptes laevis*; the small body-louse, *Menopon pallidum*; the large body-louse, *M. biseriatum*; the head-louse, *Lipeurus heterographus*; the wing-louse, *L. variabilis*; the large turkey-louse, *Goniodes stylifer*; and the poultry-tick, *Argas persicus* [*R.A.E.*, B, vii, 67].

POMEROY (A. W. J.). **The Prophylaxis of Malaria in Dar-es-Salaam, East Africa.**—*Jl. R.A.M.C., London,* xxxv, no. 1, July 1920, pp. 44–68, 1 plan, 2 charts, 4 figs.

The mosquito control measures undertaken in Dar-es-Saalam are described, and the organisation of the mosquito brigade is discussed, the importance of drainage and control of swamp land being emphasised.

The species found in 1918–19 included *Anopheles funestus*, Giles, *A. costalis*, Lw., *A. maculipalpis*, Giles, *Banksinella lineatopennis*, Ludl., *Culex fatigans*, Wied., *C. bitaeniorynchus*, Giles, *C. consimilis*, Newst., *C. tigripes*, Grp., *C. annulioris*, Theo., *C. invidiosus*, Theo., *C. duttoni*, Theo., *C. thalassius*, Theo., *C. sitiens*, Wied., *C. aurantapex*, Edw., *C. laurenti*, Newst., *C. simpsoni*, Theo., *Stegomyia fasciata*, F., *S. simpsoni*, Theo., *Eretmopodites quinquevittatus*, Theo., *Toxorhynchites brevipalpis*, Theo., *Mansonioides uniformis*, Theo., *Culiciomyia nebulosa*, Theo., *Ochlerotatus pembaensis*, Theo., *O. albocephalus*, Theo., *Harpagomyia taeniorostris*, Theo., and *Uranotaenia mashonaensis*, Theo.

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By cutting down the grass at the beginning of the dry season, the small pools formed by the rain are exposed and dried out before they prove a breeding place for mosquitos. Infestation by adult mosquitos was also greatly reduced by clearing the ground round dwellings. Owing to the danger of the flooded hoof-prints of cattle, their traffic was regulated by special police so that all such puddles could immediately be treated. A mixture of equal quantities of crude oil and kerosene proved best for oiling pools. In the case of large surfaces it was found best to make frames of dried stems of sisal plants lashed horizontally and laid on the surface of the water so as to prevent the oil from being all blown to one part of the pond. The use of fish as destroyers of larvae is also advocated. At Dar-es-Salaam top-minnows proved most effective for practical work in addition to *Tilapia nilotica*, *T. ovata*, *T. natalensis*, *T. mossambica*, *Electris fusca*, *Gobius giuris*, *Fundulus guentheri*, *Ambassis commersoni* and *Mugil macrolepis*. Six fish were found able to cope with a heavily infested tank of an average capacity of 200 cubic feet.

Experiments show that the minimum period for the incubation of the eggs of *Culex fatigans* is under 24 hours, the minimum period for the larval stage is under 120 hours and that of the pupal stage under 48 hours, thus giving a minimum life-cycle of less than 192 hours. Completion of the life-cycle may therefore be prevented by oiling infested water every 7 days. Although the foulest cesspool water proved the best medium for Culicines, Anophelines were noticed to avoid any water in the least contaminated by sewage; and they develop most rapidly in rain-filled ditches with plenty of growing plant life.

Of the mosquito repellents tried, 1 oz. of soft-soap, 20 c.c. of paraffin and 20 c.c. of eucalyptus oil proved the most effective, but its use is not advocated.

BRUMPT (E.). **Les Piroplasmes des Bovidés et leurs Hôtes vecteurs.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 6, 9th June 1920, pp.416–460, 12 figs.

The organisms causing piroplasmosis of cattle are discussed at length; they include seven different species of *Piroplasma* and two of *Anaplasma*. They may be recognised by distinctive morphological and biological characters, which are here described.

The species dealt with include: *Piroplasma bovis*, transmitted by *Ixodes ricinus* (*Haemaphysalis punctata* being probably an accidental host of this organism). *P. argentinum*, transmitted by *Margaropus annulatus australis*; *P. bigeminum*, transmitted by *M. annulatus*, and its varieties such as *M. a. australis* in Australia, *M. a. decoloratus* in Southern Africa, and *M. a. calcaratus* in Northern Africa; experimentally it has also been transmitted by *Rhipicephalus appendiculatus* and *Haemaphysalis punctata*.

*Theileria parva* is usually transmitted by *Rhipicephalus appendiculatus* (*nitens*), which changes its host three times. *R. evertsi*, *R. capensis* and *R. simus* are also capable of transmitting this organism, and *Hyalomma aegyptium* is considered by some authors to be a vector. In Macedonia, Transcaucasia and Tunisia it is also probably carried by *R. bursa* and *R. sanguineus*.

*Theileria mutans* is transmitted by *R. simus*, *R. evertsi* and occasionally by *R. appendiculatus.* It may also be carried by *Hyalomma aegyptium.* *R. bursa* and *R. sanguineus* are also suspected as probable hosts.

*Anaplasma marginale* may be transmitted by *Margaropus annulatus decoloratus* and *Rhipicephalus simus.* *Anaplasma centrale* is transmitted by *M. a. decoloratus.* The carrier of *Anaplasma argentinum*, which is morphologically identical with *M. marginale* and is believed to have been imported into S. America with cattle from Spain, has not been determined, but is probably a species of *Amblyomma.*

The pathogenic rôle of *Piroplasma hudsonius bovis* in British Columbia has not so far been ascertained, but it is probably transmitted by *Dermacentor venustus.*

Sergent (Et.). **La Diagnostic de l'Infection latente dans le Paludisme des Oiseaux** (*Plasmodium relictum*).—*C.R. Soc. Biol., Paris,* lxxxiii, no. 25, 17th July 1920, pp. 1063–1064.

The various methods of diagnosing latent malarial infection in birds are discussed.

Chapin (R. M.). **The Chemical Composition of Lime-Sulphur Animal Dips.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 451, 14th December 1916, 16 pp. [Received 27th July 1920.]

The reactions in lime-sulphur animal dips occurring as a result of storage, lime added after dilution, and variation in the ratio of lime-sulphur, of period of boiling and of concentration, etc., are discussed.

Hirst (S.). **Notes on Acari parasitic on Birds, with Descriptions of two new Species.**—*Ann. Mag. Nat. Hist., London,* v, no. 31, July 1920, pp. 121–122.

The mites dealt with include: *Syringophilus columbae*, sp. n., on pigeons in Texas; *Pterolichus sculpturatus*, sp. n., on ostriches in the Transvaal; *P. bicaudatus*, Gerv., on South African ostriches in Cape Colony and California; and *Liponyssus silvarum*, C. & F., on sparrows and poultry in the United States. This is apparently the first record of the latter species occurring on poultry. In Russia it has been found on *Motacilla alba.*

Roubaud (E.). **Emploi du Trioxyméthylène en Poudre pour la Destruction des Larves d'***Anopheles.*—*C.R. hebdom. Acad. Sci., Paris,* clxx, no. 25, 21st June 1920, pp. 1521–1522.

Powdered trioxymethylene sprinkled evenly on the surface of water, causes the destruction of any *Anopheles* larvae devouring it. Ponds, etc., might be treated at regular intervals to prevent the development of adult Anophelines as the powder in no way renders the water unfit for use or poisonous to cattle or fish. The operation should be carried out as far as possible during warm, sunny weather when the feeding activity of the larvae is at its greatest.

ROUBAUD (E.). **Mode d'Action du Trioxyméthylène en Poudre sur la Larve d'Anophèle.**—*C.R. hebdom. Acad. Sci., Paris,* clxxi, no. 1, 5th July 1920, pp. 51–52.

Powdered trioxymethylene has a twofold effect on *Anopheles* larvae, first paralysing them and then preserving the tissues from decomposition.

BEDFORD (G. A. H.). **Ticks found on Man and his Domestic Animals and Poultry in South Africa.**—*Jl. Dept. Agric., Pretoria,* 1, no. 4, July 1920, pp. 317–340, 29 figs.

A useful résumé is given of the classification of ticks, with notes on how to distinguish the different species, their life-histories, their animal hosts and the diseases they transmit. Its object is to enable farmers to recognise the different species, and thus prevent their spread.

The paper concludes with a list of ticks that have been found on man and domestic animals in South Africa and of the diseases transmitted by them.

MANETTI (C.). **L'Allevamento del Bestiame nell'Africa Occidentale. I. Angola.** [Cattle Breeding in West Africa, I. Angola.]—*L'Agric. Colon., Florence,* xiv, no 6, June 1920, pp 257–268.

The information given here on cattle breeding in Angola, Portuguese West Africa, has been obtained from several sources to which full reference is made.

Among the injurious insects recorded are :—*Glossina palpalis* var. *wellmani*, Aust., transmitting *Trypanosoma pecaudi* ; the ticks, *Boophilus* (*Margaropus*) *decoloratus* and *Rhipicephalus appendiculatus,* transmitting *Piroplasma bigeminum* and *Theileria parva* ; *Rhipicephalus simus* (black-pitted tick) ; *R. evertsi* (red tick) ; and *Amblyomma hebraeum* (bont tick).

**Dipping Cattle for Mange in the Prairie Provinces.**—*Agric. Gaz. Canada, Ottawa,* vii, no. 6, June 1920, pp. 479–481.

In consequence of the presence of mange amongst the herds of Southern Alberta and South-Western Saskatchewan, the United States prohibited the importation of all Canadian cattle from mange-infected areas, except for immediate slaughter. In view of this, and of the fact that under the existing regulations the disease, which had been present for a number of years, could not be wiped out without more active co-operation than the stock owners would give, a compulsory dipping order was passed, providing for a first dipping commencing on 4th June, and a second dipping not less than ten nor more than fifteen days thereafter. The interval is designed to ensure the destruction by the second dipping of those parasites that were in the egg-stage at the time of the first.

A number of regulations for the shipment of cattle provide for certificates for animals shipped outside the area for purposes other than immediate slaughter, or for any cattle exported to Europe ; for an inspection at Winnipeg of cattle for immediate slaughter going east ; and, in the case of infected cattle for immediate slaughter on transit within the area, for the prevention of the spread of infection. The protection from infection of cattle passing through the area from outside is also considered.

HASE (A.). **Die Bekämpfung der Läuse, Wanzen und anderer Parasiten; insbesondere die Bekämpfung mittels Blausäure.** [Work against Lice, Bugs and other Parasites, especially by Means of Hydrocyanic Acid.]—*Verh. Deutschen Ges. angew. Entom., II. Mitgliederversammlung, Munich, 24–26 September 1918*; *Berlin*, 1919, pp. 88–105. [Received 28th July 1920.]

This paper broadly reviews the development and present state of methods for combating lice, bugs, mosquitos, flies, fleas, and the mites causing mange (*Sarcoptes* and *Psoroptes*).

TEICHMAN (E.). **Dipteren als hygienische und wirtschaftliche Schädlinge.** [Diptera as Hygienic and Economic Pests.]—*Verh. Deutschen Ges. angew. Entom., II. Mitgliederversammlung, Munich, 24–26 September 1918*; *Berlin*, 1919, pp. 105–121. [Received 28th July 1920.]

A short review is given of the Diptera that are considered injurious, followed by brief notes on the measures adopted against the parasites of man and animals and against crop pests.

HARMS (B.). **Die Larven der Flöhe als Träger von Krankheitserregern.** [Flea Larvae as the Carriers of the Causal Agents of Disease.]—*Verh. Deutschen Ges. angew. Entom., II. Mitgliederversammlung, Munich, 24–26 September 1918*; *Berlin*, 1919, pp. 122–130. [Received 28th July 1920.]

Up to the present some 15 animal parasites, mostly Protozoa, have been found in fleas, some being the causal agents of disease in man and animals. Some of the parasites occur only in the adult fleas, while others also occur in the larvae. In the larvae they are chiefly found in the intestine, especially in the hind-gut. Mention is made of a large number of records, the reference to the literature being given in each case.

WILHELMI (J.). **Zur Frage der Uebertragung der Maul- und Klauenseuche durch stechende Insekten, unter besonderer Berücksichtigung von** *Stomoxys calcitrans*. [The Question of the Transmission of Foot and Mouth Disease by Biting Insects, with special regard to *S. calcitrans*.]—*Verh. Deutschen Ges. angew. Entom., II. Mitgliederversammlung, Munich, 24–26 September 1918*; *Berlin*, 1919. pp. 156–167. [Received 28th July 1920.]

While a great deal of research has been done on the aetiology of foot and mouth disease, it is remarkable that no investigation has dealt with the possibility of its transmission by some blood-sucking insect. The value of such a discovery cannot be underrated from the point of view of practical prophylaxis. A consideration of the affected animals shows that those with cloven hoofs are chiefly attacked, domestic species more than wild ones, herbivorous species more than carnivorous species, and that the disease is not confined to any particular geographical zone. It is therefore necessary that the suppositious insect vector should be either a temporary or permanent ectoparasite of the mammals affected, or that it should be closely associated with them; it must occur in the open, but should be adapted to domestic, herbivorous animals and to an indoor life; it must occur in all regions where and at all seasons when the disease occurs.

The biology of *Stomoxys calcitrans* and the epidemiology of foot and mouth disease have sufficient relation to make transmission by the fly a possibility, although, of course, the aetiology of the disease makes transmission without a living vector quite feasible.

SACK (P.). **Ueber Malaria und *Anopheles* in Deutschland.** [Malaria and *Anopheles* in Germany.]—*Verh. Deutschen Ges. angew. Entom., II. Mitgliederversammlung, Munich, 24–26 September 1918*; *Berlin,* 1919, pp. 167–196. [Received 28th July 1920.]

Lists are given of the localities in Germany where malaria has been recorded and where *Anopheles maculipennis* and *A. bifurcatus* have been observed. The former is the predominant species. There are also notes on the life-history of these mosquitos, and on the transmission of the disease, of which the tertian form is endemic in Germany.

For the effective prosecution of anti-malarial work the following measures are necessary:—The establishment of a central bureau to direct all operations; the accurate determination of all places where Anophelines occur and where malaria exists or has recently existed; the treatment of all cases with quinine or salvarsan, such individuals as cannot be treated in this way being removed to localities that are known to be free from Anophelines. It is only by a uniform and methodical campaign that the danger of this disease spreading in Germany can be prevented.

FÜLLEBORN (F.). **Nachtrag zu meiner Arbeit über Ophthalmomyiasis.** [An Addition to my Paper on Ocular Myiasis.]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic,* xxiv, no. 4, May 1920, pp. 97–100, 2 figs.

With reference to a former paper [*R.A.E.*, B, viii, 151], the author draws attention to a subsequent publication by Prates [*R.A.E.*, B, viii, 66] and to the work of Portchinsky in 1913 [*R.A.E.*, B, i, 134], of which he was previously unaware. Both these authorities mention *Oestrus ovis* as occasionally causing ocular myiasis, and therefore a doubt still remains whether the larva in the case observed by the author in the North of France belongs to this species or to *Rhinoestrus*.

MARTINI (E.). **Kritische Betrachtungen zur Lehre von der Einheit der Malariaerreger.** [A Criticism of the Theory of the Unicity of the Causal Agent of Malaria].—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic,* xxiv, no. 4, May 1920, pp. 100–113.

Every exact discussion of the epidemiology of malaria must first define the position taken up with regard to the unicist theory [*R.A.E.*, B, vi, 12, 205, 232].

Up to the present the conception involved in this theory was that the character of human malaria changed as a result of climatic influence, and appeared either as benign or malignant tertian. In a recent paper Plehn appears to indicate, however, that human malaria may revert from malignant to benign tertian owing to cold weather, and that in the mosquito the benign form may be re-transformed to the malignant owing to warm weather.

The author criticises these conclusions and expresses the view that the unicist hypothesis leads in fact to results that are inexplicable, and requires a number of auxiliary hypotheses. He points out that while the American settlement of Portobello (Panama) was practically free from malaria (only an occasional case of benign tertian occurring there), the township of the same name on the gulf suffered from disease of the malignant type. As the climate was the same the presence of two diseases must be assumed, of which the malignant form had been eradicated in the American settlement, while the benign form occasionally occurred there owing to its tenacity in man. Similar observations will probably be multiplied wherever malaria control is energetically prosecuted, and the eradication of one form at a time when the other endures will definitely negative the unicist theory. The acceptance of three different causal agents agrees better with existing facts.

MOLLOW (W.). **Ein Malariagesetz in Bulgarien.** [An Anti-Malaria Law in Bulgaria.]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic,* xxiv, no. 5, June 1920, pp. 129–132.

A résumé is given of the anti-malaria law passed in 1919 in Bulgaria. This is based on similar legislation in Italy, Greece and Rumania, one chapter dealing with anti-mosquito measures, including extensive screening.

ZUPITZA (M.). **Ein Weg zu erfolgversprechender Bekämpfung der Schlafkrankheitsfliege am Tanganika.** [A Way to combat the Sleeping Sickness Fly successfully on Lake Tanganyika.]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic,* xxiv, no. 6, June 1920, pp. 161–166. [Received 3rd August 1920.]

When in 1914 the author visited the sleeping-sickness area in the Tanganyika-Russisi region, the measures adopted there had prevented the spread of the disease, but its ultimate suppression was endangered by the unsolved problem of *Glossina* control.

The entire eastern shore of Lake Tanganyika is exposed to infestation by fly from the marshes on both banks of the Russisi.

The whole area is now under the administration of the Belgian Congo, and anti-*Glossina* work must be resumed. The key to successful fly-control is to be found on the western bank, where the only outlet from the lake, the Lukuga river, is to be found. About 2½ miles from the lake this river flows through a rocky gorge, the width and depth of which determines the average water-level of the lake. By widening and deepening this passage the level will be artificially lowered, thus draining both the marshes and the sub-soil water in depressions along the banks. This will destroy the reeds and other aquatic plants and dry the air, so that conditions will become unfavourable to the fly. The low level of the lake will quicken the current in the lower reaches of all its tributaries, and this will clear their beds and drain the sub-soil water around them.

The disadvantages of this plan include the possible formation of fresh depressions in the reclaimed areas, and the reconstruction of the wharves and of the terminal portions of the railways leading to the lake.

This suggestion is advanced in the interests of the native population, and it is hoped that it will be subjected to careful consideration.

Nöller (W.). **Neuere Forschungen auf dem Gebiete der Trypanosomenzüchtung.** [New Investigations relating to the Method of Reproduction among Trypanosomes.]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic,* xxiv, no. 6, June 1920, pp. 168–172. [Received 3rd August 1920.]

The title of this paper indicates the nature of its contents. The conclusions reached are :—As the transformation of trypanosomes into crithidial bodies and *vice versa* is possible *in vitro* also, the various forms in the carrier are not based on a sexual development ; the genus *Crithidia* must be held to be a synonym of *Trypanosoma,* for it is probable that the trypanosomes of non-blood-sucking bugs that do not change their host may transform into the trypanosome type under the conditions of the blood-trypanosomes ; the fact that at 37° C. (99° F.) the increase of culture trypanosomes becomes slowed down or stops altogether, is in favour of Léger's theory that trypanosomes have evolved from flagellates from invertebrates, which have their chief increase at a low temperature. In many trypanosome groups there are primitive characters indicative of this. From these forms a line of evolution may be traced to the African pathogenic trypanosomes, thence to the trypanosomes that are transmitted purely mechanically (surra, etc.), and finally, to *Trypanosoma equiperdum,* which requires no carrier.

Martini (E.). **Mitteilungen über Stechmücken.** [Communications regarding Mosquitos.]—*Arch. f. Schiffs- u. Trop.-Hyg., Leipsic,* xxiv, no. 6, June 1920, pp. 177–178. [Received 3rd August 1920.]

With few exceptions *Anopheles maculipennis* occurs in all the villages around Hamburg ; *A. bifurcatus* is also found.

Two new species, *Aëdes rostochiensis* from Warnemünde and *A. semicantans* from Müritz, are briefly described.

The thymol ointment recommended by d'Ormea [*R.A.E.,* B, viii, 2] has scarcely any repellent effect on *Stegomyia fasciata.* Two specimens of *Anopheles bifurcatus* bit within a short time of one another, although a repellent action was visible. The behaviour of different species to repellent substances is very variable. In 1914 it was noticed that citronella soap and other similar soaps and tinctures were effective against *Culex pipiens,* but not against *C. nemorosus. C. pipiens* is not a ready feeder on mammalian blood and *Anopheles* feeds with difficulty on avian blood, while *S. fasciata* takes both readily.

Eckstein (F.). **Malariaforschung in Bayern.** [Malaria Investigation in Bavaria.]—*Münchener Med. Wochenschr., Munich,* 1920, no. 7, pp. 183–184, 6 figs.

The study of malaria control in Bavaria was assigned in 1918 to the new Research Institute for Applied Entomology in Munich and the work was undertaken by the author.

It was first of all necessary to collect data regarding the location and abundance of Anophelines in the country. A circular on these mosquitos was distributed to the local authorities, doctors, and teachers in order to draw their attention to the subject and to enlist their co-operation. The latter aim was not achieved owing to popular indifference to scientific questions, and to the real difficulty experienced by laymen in recognising Anophelines. This difficulty has been met in Baden by special instruction in anti-mosquito work. Malaria notification is obligatory there, but in Bavaria this has had to be postponed owing to the mass of work it would throw on medical men.

*Anopheles maculipennis, A. bifurcatus* and *A. plumbeus* (*nigripes*) are the three species found in Germany. Details are given of the characters and habits that enable them to be differentiated. The habitat of these mosquitos has some relation to the development in them of the malaria parasite. In the forest species, *A. plumbeus*, the parasite can develop only during a very warm summer. The out-door temperature is not involved in the case of *A. maculipennis* and *A. bifurcatus*, as they are domestic species. The higher and more equable daily temperature indoors is a point that deserves attention. It is often erroneously asserted that the development of the parasite is impossible in Germany, but this is negatived by the cases that occur in individuals that have never been away from their native district. Up to the present Anophelines have been reported from only a few localities in Bavaria. A survey of the right bank of the Rhine is to be undertaken. In the valley of the Danube, from the Suabian Alps down to Passau, *A. maculipennis* and *A. bifurcatus* are common and *A. plumbeus* occurs in the forests. The occurrence of indigenous malaria is therefore quite possible in Bavaria, and careful observation of Anophelines is called for.

The author had ample opportunities for testing mosquito-repellent preparations. Odourless substances sometimes proved quite as effective as those with a pronounced smell. Cedar-wood oil was better than the ethereal oils from indigenous plants. Though of little use, cod-liver oil was better than petroleum.

DE BEAUREPAIRE ARAGÃO (H.). **Sobre a pretensa Identidade entre** *Ornithodoros rostratus*, **Aragão 1911, e** *Ornithodoros turicata*, **Dugés 1876.** [On the alleged Identity of *O. rostratus*, Aragão, with *O. turicata*, Dugès.]—*Arch. Escola Sup. Agric. e Med. Vet., Nictheroy* (*Rio de Janeiro*), iii, no. 1–2, December 1919, pp. 1–5, 3 plates. [Received 10th August 1920.]

The author disagrees with those who treat *Ornithodoros rostratus*, Aragão, as a synonym of *O. turicata*, Dugès [*R.A.E.*, B, vii, 11]. An illustrated description is given of each of these ticks, particular attention being drawn to the tarsi.

FULLAWAY (D. T.). **The Horn-Fly Problem.**—*Hawaiian Forester and Agriculturist, Honolulu*, xvii, no. 6, June 1920, pp. 166–167.

Several blood-sucking flies, notably the horn-fly [*Lyperosia irritans*, L.] are a source of perpetual irritation to cattle, undoubtedly resulting in reduced weight or lowered milk production. Their development from ova to mature insects is accomplished in the dung of cattle and horses; and while considerable attention has been given to the problem of their control, hardly any improvement in the situation has resulted. Some natural agency is required that will prevent the development of the flies, as artificial methods of dung disposal are impossible in Hawaiian conditions. The introduction of dung-feeding beetles [*cf. R.A.E.*, B, vii, 186] and of birds has been suggested. The second idea is supported by the relative freedom of Honolulu from the house-fly, which is due to the comparative scarcity of horse-manure and the rapid drying of the manure aided by the activity of the common English sparrow in scattering the droppings.

Ferguson (E. W.) & Henry (M.). **Tabanidae from Camden Haven District, New South Wales, with Descriptions of New Species.**—*Proc. Linn. Soc. N.S.W., Sydney*, xliv, pt. 4, 26th November 1919, pp. 828–849, 1 plate. [Received 11th August 1920.]

During a three years' study of the means of transmission of *Onchocerca gibsoni* in cattle, special attention was paid to Tabanidae as possible vectors of the larvae either as mechanical transmitters or as intermediate hosts.

Descriptions of the new species found are given with a record of all the species obtained and such notes on the times of occurrence, seasonal distribution, etc., as are available.

The new species described are :—Pangoniinae : *Erephopsis niveovittata, E. aureovestita, Diatomineura fulgida, Silvius paraluridus* ; Tabaninae : *Tabanus vespiformis, T. trilinealis, T. pygmaeus, T. kewensis, T. ochreoflavus, T.* (*Therioplectes*) *innotatus*.

**Yearly Report from 1st January 1919 to 31st December 1919.**—*Australian Inst. Trop. Med., Townsville, Queensland*, 30th April 1920, pp. 3–8.

Investigations on the transmission of filariasis were continued during the year. In a previous work it has been conclusively proved that *Filaria immitis* taken up with the blood by the dog flea [*Ctenocephalus canis*] undergoes complete development in the flea, the mature larvae being ready to infect the new host. At the onset of the cool weather the work had to be abandoned. Similar studies were undertaken using the mosquito, *Stegomyia fasciata*, as intermediary host. The developing parasites in the mosquito were found to agree morphologically with those found in the dog flea.

Experiments with artificial infection of dogs indicate that the filarial larvae may penetrate through the unbroken skin, and thus cause infection. Future work is expected to yield additional evidence of this possibility.

Hill (G. F.). **Report of the Entomologist from 25th February to 31st December, 1919.**—*Australian Inst. Trop. Med. Rept. 1919, Townsville, Queensland*, 30th April 1920, pp. 10–11.

Simuliids and Chironomids were not very abundant during the year under review. Tabanids were rarely seen in March and were not again met with until December. As egg-clusters were extremely rare, attention was directed to the larvae, and those of three species were secured, two of which were reared to the adult stage. The hitherto unknown male of a common North Australian species and the unknown female of a unique form from Townsville have thus been added to the collection. The females of most Australian Tabanids are voracious bloodsuckers, but there is no evidence that they are disease transmitters to man or stock.

Among mosquitos, the larvae of *Culicelsa consimilis* were particularly abundant in hoof-prints, a considerable number of *Anopheles* (*Nyssorhynchus*) *annulipes* being associated with them. The water was covered with an iridescent film and frequently contained masses of algal growth. The larvae of *C. consimilis* were most abundant from 27th March to 5th May, and disappeared by about 10th June. The number of larvae of *A. annulipes* began to diminish from 19th April to about 5th May. All efforts to induce females of *A. annulipes* to feed in captivity failed. A single individual of *Culex bitaeniorhynchus* was taken in the same hoof-prints. The importance of continuing and extending the mosquito survey of North Queensland is emphasised in view of the discovery of a new species of *Stegomyia*. *Ochlerotatus* (*Scutomyia*) *notoscriptus* is widely distributed, and was generally associated with *Stegomyia*.

JOHNSTON (T. H.). **The Chalcid Parasites of Muscid Flies in Australia.**—*Science & Industry, Melbourne,* ii, no. 5, May 1920, pp. 308–312.

This paper is an abstract of a more detailed work by the author and Miss Bancroft published by the Royal Society of Queensland, 1920. The work on parasites recorded as being already present on the continent is briefly reviewed, and the advisability of introducing certain beneficial Hymenoptera into Australia is discussed.

The species already occurring in Eastern Australia include the Pteromalids, *Spalangia muscidarum*, *Nasonia brevicornis* and *Pachycrepoideus dubius*, and the Chalcids, *Chalcis calliphorae* and *Dirhinus sarcophagae*. Various stages of *Spalangia muscidarum*, Richardson, and its method of parasitising certain species of bush flies are described.

Parasites that have been suggested for introduction into Australia include the Braconids, *Alysia manducator*, Panz., and *Aphaereta cephalotes*, Hal., and a Chalcid, *Melittobia acasta*, Wlk., but as the last-named is also a hyperparasite of many useful insects it would probably not be wise to introduce it. The most valuable of these three is apparently *A. manducator*.

JOHNSTON (T. H.) & BANCROFT (M. J.). **The Cattle Worm-Nodule Parasite.**—*Science & Industry, Melbourne,* ii, no. 5, May 1920, pp. 315–316.

This paper is an abstract of a fuller work by the same authors entitled "Experiments with certain Diptera as possible Transmitters of bovine Onchocerciasis" published in the Proceedings of the Royal Society of Queensland 1920. Attention is drawn to the occurrence of a second species of *Onchocerca* in Australia, *O. bovis*. It is already known from France and North and South America.

No definite transmitter of bovine onchocerciasis has yet been found. The flies experimented with gave mostly negative results, the species used including *Tabanus circumdatus*, *T. australicus*, *T. mastersi*, *T. dubiosus*; *Musca australis*, Mcq. (*fergusoni*, Jnstn. & Banc.), *M. vetustissima*, Wlk., *M. terraereginae*, Jnstn. & Banc., and *Fannia* sp.

AUSTEN (E. E.). **Diptera: Tabanidae. (The Percy Sladen Trust Expedition to the Indian Ocean in 1905, and 1907–1909).**—*Bull. Entom. Res., London*, xi, no. 1, August 1920, pp. 43–45.

The Tabanids brought back by the expedition include representatives of four species, one being new. They are *Aegophagamyia terticeps*, Aust., from Astove Island and Aldabra; *Bouvierella alluaudi*, Giglio Tos, and *B. inornata*, sp. n., from the Seychelles; and *Tabanus albipectus*, Bigot, from Aldabra, the Amirante, and other Isles.

LLOYD (Ll.). **On the Reasons for the Variation in the Effects of Formaldehyde as a Poison for House-flies.**—*Bull. Entom. Res., London*, xi, no. 1, August 1920, pp. 47–63.

In a number of experiments with formaldehyde, the points considered included the effect on its efficiency as a poison for *Musca* of impurities in it, the humidity of the atmosphere, the strength of the solution, and the addition of a bait. At the same time an attempt was made to find the most effective mode of administration, and to compare formaldehyde with other poisons.

The results of these experiments are summarised as follows:—The effective action of formaldehyde as a fly-poison depends on the freedom of the exposed fluid from formic acid, and, to a less extent, from methylamine. That used for fly-poison should therefore be colourless and free from a fishy odour, and a weak alkali, in slight excess, should be added to neutralise any acid present or that will be formed during exposure. The formula recommended is, 5–6 per cent. of 40 per cent. formaldehyde, 50 per cent. of clear lime water, 2·5 per cent. of sugar, and water to make 100.

This should be exposed in a trap that will protect it from the air and will prevent flies from falling into it. Formaldehyde, like any other stomach-poison for flies, is most effective under dry conditions.

ZETEK (J.). ***Anopheles* breeding among Water Lettuce. A New Habitat.**— *Bull. Entom. Res., London*, xi, no. 1, August 1920, pp. 73–75.

This paper is a consideration of the possible danger to the Panama Canal Zone that may be caused by the floating islands and other masses of water lettuce (*Pistia stratiotes*) acting as a breeding place for mosquitos. The water lettuce is the habitat of the very highly specialised larvae of *Taeniorhynchus* (*Mansonia*), of which *T.* (*M.*). *titillans* is the commonest member. But in 1918 *Anopheles* larvae were also found in it. The habitat is favourable in many ways; the larvae are protected from the direct sun's rays, from larvicidal fish, and to a large extent from predaceous insect larvae and wave action. But the most important advantage is the exceptionally favourable condition produced by the presence of the oxygen given off by the green lettuce.

Another important aspect of the question is that the wind and current detach portions of the floating vegetation, and carry it across deep water to localities that the larvae would not otherwise reach. If these floating islands have to be controlled—and it will depend on the cumulative evidence gathered by the District Sanitary Inspectors whether or not this will be necessary—the logical method is to destroy the habitat. This may be costly and prolonged, and perhaps prohibitive where large numbers of bayous, ponds, cut-offs, etc., exist. If Anophelines alone are to be controlled, spraying with a phenol-resin soap emulsion every six days will probably be all that is necessary. This may even be effective against *T. titillans*, against which, owing to the oxygen produced by the *Pistia*, ordinary oiling is as ineffective as in the case of *Mansonioides africanus* [*R.A.E.*, B, v, 57].

SWELLENGREBEL (N. H.) & SWELLENGREBEL DE GRAAF (J. M. H.). **List of the Anophelines of the Malay Archipelago with Special Reference to Adults and Larvae of new or incompletely described Species or Varieties.**—*Bull. Entom. Res., London*, xi, no. 1, August 1920, pp. 77–92, 11 figs.

The bulk of the information contained in this paper has been dealt with elsewhere [*R.A.E.*, B, vi, 53 ; vii, 183 ; viii, 136]. To prevent confusion, Theobald's nomenclature is mainly adhered to.

In an editorial note it is stated that *Anopheles* (*Myzomyia*) *flava*, Swellengr. [*loc. cit.* vi, 214] and *A. immaculatus*, Theo., are conspecific, the latter name having priority.

MACDONALD (A.). **On the Relation of Temperature to Malaria in England.**—*Jl. R.A.M.C., London*, xxxv, no. 2, August 1920, pp. 99–119.

The low average of temperature in England is apparently responsible for the periodical dying out and reappearance of malaria. The presence of carriers and mosquitos may produce little or no indigenous infection unless a suitable temperature coincides with carrier importation. The temperature directly influences the distribution and incidence of malaria, as a mean temperature of about 59° F. to 60° F. over a period of at least sixteen days is required for the complete development of the plasmodium within the mosquito. It is evident that elevation of temperature alone without extent and continuity is not sufficient for the propagation of the organism. According to the records a brief period suitable for propagation is presented in most years in a certain area of England mainly south of the Humber, but it cannot take place normally under natural conditions in Scotland ; in Ireland the postulated temperature is attained for a brief period of the year in Dublin.

The natural inference to be drawn from the study of the facts in relation to the occurrences of malaria in 1856–1860 and 1917–1919 is that in England the elevation of temperature necessary for the propagation of malaria does not occur with the certain regularity of extent and continuity required to maintain endemicity ; and that indigenous occurrence depends on carrier importation, which in sufficient volume, in the presence of an abnormal extent of high temperature, may engender epidemics and initiate a temporary endemicity, limited in area and years.

The occurrence of malaria of undoubted indigenous origin in the spring months of 1918 is thought to be probably a result of plasmodial development brought about by incubation at the indoor temperature of occupied and artificially heated rooms.

In all indigenous cases the protozoon found has been *Plasmodium vivax*, which is generally transmitted by *Anopheles maculipennis*. *P. praecox* (*falciparum*) probably requires a higher temperature or longer continuity for its development.

The inability to prognosticate the temperature of any year compels the taking of preventive measures in England in face of a large importation of infection.

TALBOT (G.). **Observations on Mosquitoes at Sandwich during the Years 1918–19.**—*Jl. R.A.M.C., London*, xxxv, no. 2, August 1920, pp. 167–175, 2 charts.

The small number of mosquitos found in the course of investigations made at Sandwich in December point to the success attending the treatment of dykes during the spring and summer of 1918. The latest date on which a larva of *Anopheles maculipennis* was found was 22nd October, this example pupating on 13th November. Males were found in October and females throughout the winter. *A. bifurcatus* was present in the larval stage throughout the winter; a pupa was found on 23rd October, but adults were not seen between October and January. Adults of *Theobaldia annulata* were present throughout the winter, but of *Culex pipiens* only females were found in the winter, the last male being seen in November. A female of *Theobaldia annulata* was found with a developed egg-mass on 18th December. It is possible that with a prolonged period of cold weather hibernation of the larvae of *Anopheles bifurcatus* may take place. *A. maculipennis* probably hibernates in the adult stage if the shelter is cold and no opportunity of feeding can occur, but conclusive evidence of this has not been obtained.

Special observations were made on the clypeal hairs of the larvae, the results of which are described.

AUSTEN (E. E.). **The House-Fly, its Life-History and Practical Measures for its Suppression.**—*Brit. Mus.* (*Nat. Hist.*), *London*, Econ. Series, no. 1A., 1920, 52 pp., 2 plates, 7 figs. Price 1*s*. 6*d*. *Nett.*

This pamphlet is similar to one already noticed [*R.A.E.*, B, i, 66] but wider in scope, including recommendations based on the experience of the late war, and being applicable to conditions in hot countries as well as in the British Isles. The chief additions to the matter already noticed are under the heading of preventive measures, particularly the disposal of manure, refuse, etc., with reference both to ordinary conditions and to those of military service.

Manure may be dealt with by close-packing, by frequent turning (to expose larvae near the surface to the heat of the inside of the heap), or by desiccation (in hot climates). Incineration of manure if properly carried out, and if practicable, is an ideal measure on service. The disadvantages of treatment with borax or hellebore to prevent fly development are numerous.

Trench latrines are ideal breeding places and should be replaced by fly-proof buckets. When latrines are filled in, or the contents of buckets or refuse buried, the pit should be sealed with sacking to prevent flies emerging through the earth.

Various methods of trapping the fully-fed maggots, based on their migratory habit before pupating, are noticed, and the usual methods of dealing with the adults flies described.

CHANDLER (S. C.). **A Study of the Malarial Mosquitos of Southern Illinois. I. Operations of 1918 and 1919.**—*Bull. Illinois Nat. Hist. Survey, Urbana,* xiii, article xi, July 1920, pp. 307–328, 9 plates.

Malaria is common in the southern third of Illinois, and this paper describes a mosquito survey in two or three representative towns, particularly Carbondale. Accurate estimates of the number of malaria cases in this town were not available, but this is probably about 2 or 3 per cent. of the population a year. The survey was carried out in the usual way, the district being mapped out and the various types of breeding places considered. The species of Anophelines found were *Anopheles quadrimaculatus,* Say (*guttulatus,* Harris), and *A. punctipennis,* the former being rare. *A. punctipennis* seems able to adapt itself to all kinds of breeding places. The usual anti-mosquito measures, namely, the drainage of breeding places ; keeping the margins clear of vegetation ; oiling ; the use of larvicides ; the screening of houses ; fumigation of rooms ; and the use of repellents [*R.A.E.*, B, vi, 69] are described.

**Report from the Select Committee on the Spread of East Coast Fever in the Union, together with the Proceedings of the Committee, Minutes of Evidence and Appendix.** *Pretoria,* 15th July 1920, xvi + 152 pp. [Received 23rd August 1920.]

The investigations of the Select Committee appointed in South Africa to inquire into the continued spread of African coast fever in the Union are reported fully, and many examinations of farmers and others who have had practical experience with the disease are given verbatim. The history of the disease in South Africa, the losses to the country, remedial measures in the past, and the present situation are discussed.

As a result of these investigations and in view of what has been done in America and Australia, the Committee recommends that the Government be requested to consider the advisability of :—

(a) Establishing a separate section in the Agricultural Department for the express purpose of combating and preventing the outbreak of African coast fever, and appointing a capable, energetic and firm official with wide experience of the disease as the head of such section, who shall be responsible directly to the Minister for the carrying out of the regulations. (b) Placing the local administration of the tick fever regulations in the hands of the resident magistrate of the district. (c) Making the local veterinary officer advisory to the magistrate (thereby relieving him as far as possible from administrative office work), and providing him with motor transport to get into closer touch with farmers, and not only to perform the proper functions of his office in tendering advice, but also to check the field administration of the magistrate. (d) Selecting as inspectors and cattle-guards men of intelligence who shall be trained in the duties pertaining to the eradication of African coast fever, and particularly to the methods for securing the efficiency of dipping tanks, with special instructions to scrutinise carefully all cattle within the areas, and ensure that they are properly dipped. Such officials should be sworn in as policemen and be subject to the police regulations. Incentives in the way of promotion should also be held out to them as a reward for vigilance and zeal in the excution of their duties. (e) Making compulsory the building of dipping tanks in areas liable to African coast fever (not only on private farms, but also on crown lands and native locations), and in that connection giving the greatest encouragement possible in the erection of such tanks by means of advances through the Land Bank under the existing law, and also by assisting farmers to secure materials for building the tanks at the cheapest rates. (f) Having all dipping tanks inspected and tested regularly at least once a month, and giving greater facilities for the testing of the liquid in such tanks. (g) Taking immediate steps in order that isometers, which are now almost unprocurable, be placed within the reach of every cattle farmer at cost price. (h) Providing every district veterinary officer with a microscope in order that he may quickly investigate and report upon the blood-smears sent to him. (i) Instituting a regular system of analysis of dipping materials offered for sale, the vendor to be under special licence and his wares to be subject to analysis by the Department at all times for strength and solubility, and that in regard thereto the Adulteration Act be strictly enforced. (j) Setting on foot an extensive African coast fever propaganda. (k) Instituting a complete and effective check upon the movement of cattle in and around infected and suspected areas by insisting (i) that permits shall only be issued by the Magistrate of the District, who may however, for the convenience of the public, depute trustworthy and responsible officials entrusted with the carrying out of the African coast fever regulations to issue movement permits in his name, and that such officials be made readily accessible by the public immediately when required; (ii) that it shall be wholly illegal to grant a permit for the movement of cattle out of or through an infected or suspected area, and that all cattle found under such illegal movement shall be instantly destroyed and the offender prosecuted; (iii) that a proper register of cattle movements under permit shall be kept and a copy thereof sent monthly to the head of the East Coast Fever Department, who shall closely scrutinise it. (l) Importing fencing material and placing it at the disposal of farmers at cost price. (m) Discontinuing the practice of killing off cattle as being ruinous and unnecessary.

In conclusion, the Committee states that the one prevailing note that was struck by every witness throughout the enquiry is the absolute necessity of short-interval dipping and hand-dressing, and acting upon the universal testimony of these witnesses the Committee has no hesitation in recommending both to the farmer and the Government a thorough and persistent policy of three, five or seven days' dipping as the only means by which all tick-borne diseases, and especially that known as east coast fever, can be eradicated. Emphasis is also laid on the fact that the systematic use of hand-dressing with an arsenical solution of adequate strength is as imperative as dipping.

Scott (J. W.). **Notes and Experiments on** *Sarcocystis tenella,* **Railliet.**—*Jl. Parasit., Urbana,* vi, no. 4, June 1920, pp. 157–166.

The results of the observations here described are summarised by the author as follows:—*Sarcocystis tenella* is apparently not an aberrant form of one of the Cnidosporidia of insects, for lambs become infected with this parasite without insects being present. Darling's hypothesis that herbivorous animals are infected with Sarcosporidia by insects is therefore probably untenable. It has been found that lambs are more certain of becoming infected and that the number of parasites per unit of muscle is greater if the animals are kept closely confined in a screened cage than if they are allowed to run free in the open. A second host other than the sheep does not seem necessary for the development of *S. tenella,* and if this is true, a sexual stage of this parasite will no doubt be found in the intestine of the sheep. The method of transmission and the life-history will be dealt with in a later paper.

Ewing (H. E.). U.S. Bur. Entom. **A Gamasid Mite annoying to Man.**—*Jl. Parasit., Urbana,* vi, no. 4, June 1920, pp. 195–196, 1 fig.

The mite, *Hyletastes missouriensis,* Ewing, is redescribed. In the vicinity of Washington, D.C., it has been recorded as causing irritation of the skin. It has also been taken from under bark in Illinois. Very little is known of its biology and distribution.

Brandt (F. R.). **Trypanosomiasis.**—*Ann. Rept. Agric. Dept., Northern Provinces, Nigeria, 1919, Lagos,* 1920, pp. 9–10. [Received 26th August 1920.]

With increased trade, and the annual movement of Fulani herds from south to north, the spread of trypanosomiasis is nearly certain to continue, as it is impossible at present to locate all the fly-belts. There is great risk in introducing an animal from a tsetse-infested locality into a clean herd, even in the absence of *Glossina,* since many biting flies, such as *Stomoxys, Haematopota* and other Tabanids, are known to act as mechanical carriers of trypanosomiasis. A number of outbreaks in 1919 are noticed.

**Preliminary Report of the Anti-Malarial Commission.**—*Cairo,* 1919, 55 pp., 7 plans. [Received 26th August 1920.]

The work done by the sub-committees of the Anti-malarial Commission in Egypt and the recommendations made by them are recorded. The various breeding places of Anophelines in Egypt include desert water; permanent marshes and lakes into which most of the arterial drains of the Delta flow; badly aligned canals and drains, fostering vegetation; dead ends of canals; borrow-pits and outcrops of infiltration water. Any attempt to abolish all possible breeding places at present is considered impracticable, but work has already been started dealing with the best defined centres and including certain measures of precaution to protect as far as possible the chief centres of population from continued infection. These include the Suez Canal zone and the oases. The nature and extent of future measures will depend on circumstances. It is realised that the extermination of Anophelines in any municipal area can only be attained by degrees in conjunction with other forms of sanitary progress. The principle adopted has been to let the Government deal with breeding places on its own property, and to call on private owners to fill in such places on their own lands. It should be possible to keep the larger towns completely free from mosquitos with a reasonable amount of expenditure. Constant watch will have to be kept against the formation of new breeding places, so that appropriate remedial measures may be applied at once.

An outline is given of the proposed anti-malaria legislation, and it is suggested that the Malaria Commission should be placed with the Governments' sanction on a permanent basis in order to enforce the law.

Parrot (L.). **Le Paludisme à la Ferme.**—*Rev. Agric. Afr. Nord, Algiers*, xviii, nos. 33 & 51, 19th March & 23rd July 1920, pp. 196–197 & 68–69.

The possibilities of mosquito extermination on farms and small estates are discussed ; the measures against mosquito larvae that are essential for control are reviewed, and instructions are given for carrying these out as simply as possible.

Nicolle (C.), Blanc (G.) & Langeron (M.). **Recherches expérimentales sur le Rôle du Gecko (*Tarentola mauritanica*) dans l'Etiologie du Bouton d'Orient. Mission de Tamerza (Octobre 1919). Note préliminaire.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 7, 7th July 1920, pp. 508–511.

The theory that the gecko (*Tarentola mauritanica*) is the reservoir of Oriental sore has frequently been propounded [*R.A.E.*, B, iii, 143, 230, etc.]. From investigations made in Tamerza, on the Algerian frontier of Tunisia, only two out of twelve geckos captured were found to be harbouring flagellates (although Tamerza is a focus of Oriental sore) and these were not discernible under the microscope except after culture. The flagellates were *Leptomonas*, but were morphologically distinct in culture from the *Leishmania* or the *Leptomonas* of the gecko of Tataouine. The first cultures developed very slowly, apparently owing to the scarcity of parasites in the blood. The virus from the infected geckos and cultures of their *Leptomonas* did not prove virulent for men, monkeys, mice or geckos.

These facts indicate that the parasite in question is a flagellate the presence of which in the blood is merely accidental. Its habitat is probably in the digestive tract of the gecko. The failure to inoculate the virus or the cultures into man, in spite of six attempts, or into monkeys, does not bear out the theory of the gecko being the natural reservoir of the virus of Oriental sore.

Nicolle (C.). **La Question du Réservoir de Virus du Bouton d'Orient. Hypothèse du Gecko. Hypothèse du Chameau.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 7, 7th July 1920, pp. 511–515.

The question of the reservoir of the virus of Oriental sore is discussed with regard to the geographical distribution of leishmaniasis. It is pointed out that in view of the impossibility of differentiating morphologically the two main groups of *Leishmania*, which cause in the one case kala-azar in man and dogs, and in the other Oriental and Occidental sore, it is useless to try to separate the species or races of flagellates by microscopic examination. The undoubted occurrence of the disease in the absence of insect bites is considered as exceptional and not as contradicting the theory of insect transmission. The existence of some reservoir of the virus other than man is considered probable, although nothing is known on the subject. If such a reservoir exists in the form of an animal, the latter must show some evidence of *Leishmania* in the blood, if only after culture ; though it is very unlikely that the animal would itself be attacked by Oriental sore. The improbability of such a reservoir being found in the dog, or such animals as the horse or donkey is explained. The theory of the gecko is a very tempting one, but the recent work of the author in collaboration with MM. Blanc and Langeron [see preceding paper] has failed to prove it true.

Much consideration has been given to the possibility of the camel as the natural reservoir of the virus. The centres of infection of the disease correspond exactly with the routes taken by the nomad tribes and their caravans when they migrate during the cold season from the plateaux towards the desert and on their return for the hot season. If the camel were the reservoir of the virus, the presence of an insect vector, owing to some condition of the flora or some other factor particular to the region, would be sufficient to ensure the transmission of the disease to man. While the occurrence of man is of almost unlimited extent, that of the camel is more restricted, but it covers the area of incidence of Oriental sore and even that of certain centres apparently not reached by the disease ; the more limited distribution of the insect vector would determine the occurrence of the classic type of Oriental sore. It might also be supposed that in South America the rôle attributed in the East to the camel would be filled by related species of animals such as the llama and vicugna. This hypothesis is an attractive one, but experiment has failed to confirm it. Two camels that showed blood free from flagellates were inoculated with a large dose of a culture of *Leishmania tropica*, the inoculation being repeated ten days later. Even after 76 days the camels have shown no sign of the sore, and tests of their blood proved negative. The hypothesis of the camel as a reservoir of the virus is therefore no more proved than that of the gecko. Neither theory, however, has been completely abandoned.

SERGENT (Ed. & Et.) & DONATIEN (A.). **Infection expérimentale des Dromadaires par le *Trypanosoma berberum* du Debab.**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 7, 7th July 1920, pp. 521–525.

The course of the form of trypanosomiasis in camels in Algeria known as "debab," due to *T. berberum*, is described from observations lasting for two years on some twenty camels that were inoculated with blood taken from an individual suffering from a naturally acquired infection. The natives believe that debab produced by the bite of a fly is almost always fatal. In the experiments described, trypanosomiasis has very seldom been the cause of death in spite of the extraordinary number of trypanosomes revealed by direct examination;

the chief results of infection have been the loss of resistance to other forms of disease, such as chills, mange, abortion in the case of females, and general debility and unfitness for work. The vicinity of infected camels is very dangerous to horses and mules, in which the progress of the disease is very rapid and nearly always ends fatally. Throughout Algeria as a whole some 10 per cent. of the camels have been found to be suffering from trypanosomiasis in the acute form, the proportion sometimes being as high as one in three in certain regions and periods, while the birth-rate is diminishing to an alarming degree.

SERGENT (Ed. & Et.) & DONATIEN (A). **Deuxième Note sur l'Hérédité de l'Infection et de l'Immunite dans la Trypanosomiase des Dromadaires.**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 7, 7th July 1920, pp. 525–527.

Experiments on camels artificially inoculated with *Trypanosoma berberum* have led to the conclusion that the females, when suffering from the acute stage of debab, transmit the disease to the foetus, which dies in consequence. In the chronic phase, which is characterised by a weak infection and relative immunity, they do not transmit to their offspring either infection or immunity.

TEJERA (E.). **Un nouveau Flagellé de** *Rhodnius prolixus, Trypanosoma* **(ou** *Crithidia*) *rangeli*, **n. sp.**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 7, 7th July 1920, pp. 527–530, 2 figs.

A new flagellate is described from the intestinal tract of *Rhodnius prolixus* in Venezuela, which is distinct from *Trypanosoma cruzi*, and to which the name *T. rangeli* is given, though it is not quite certain whether it should be considered as belonging to this genus or to *Crithidia*. The flagellate is found in the nymphal as well as the adult form of this bug. Insects reared in the laboratory are apparently immune from the parasite. Individuals that are left without food for more than two months seem to become free from infection. It is proposed to investigate the possibility of the development of this flagellate in vertebrates.

MONTPELLIER (J.), DEGOUILLON & LACROIX (A.). **La Gale filarienne est-elle bien une Manifestation de Volvulose?**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 7, 7th July 1920, pp. 530–535.

In consequence of some discussion that has arisen concerning the possible identity of the embryo of *Onchocerca volvulus* with that producing filarial mange, the authors have made a comparison between the characteristics of the microfilaria studied by them and the embryos of filaria previously described as infesting man. The conclusion has been reached that the microfilaria of *O. volvulus* and those taken from the skin of natives suffering from filarial mange show such similarity of character that it is morphologically impossible to differentiate them, and that this microfilaria differs distinctly from the various embryos of adult filaria previously described as infesting man.

SMILLIE (W. G.). **The Prevalence of** *Leptospira icterohaemorrhagiae* **in the wild Rats of São Paulo, Brazil.**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 7, 7th July 1920, pp. 561–568.

Existing knowledge with regard to the *Leptospira* of infectious jaundice is reviewed. From tests carried out in Brazil it seems probable that 75 per cent. or more of the rats of São Paulo harbour *Leptospira icterohaemorrhagiae.*

LAVERAN (A.) & FRANCHINI (G.). **Infections expérimentales de Chiens et de Cobayes à l'aide de Cultures d'***Herpetomonas* **d'Insectes.** —*Bull. Soc. Path. Exot., Paris,* xiii, no. 7, 7th July 1920, pp. 569–576, 1 fig.

It has previously been shown that severe infection, resulting sometimes in death, can be produced in white mice by inoculation with flagellates from various insects [*R.A.E.*, B, vii, 145, 158, 160, etc.]. The present paper describes the results of similar inoculations into dogs and guinea-pigs. Two dogs were inoculated with cultures of *Herpetomonas phlebotomi.* One of them showed lesions greatly resembling Oriental sore 8 days after the inoculation, the infection lasting 54 days and the lesions yielding parasites greatly resembling *Leishmania tropica.* The infection remained localised and reinoculation later on was without result, showing that the animal had acquired immunity. The second dog was a very young animal and, perhaps in consequence, seemed much more susceptible to the virus. A similar inoculation to the above produced in this case a general infection, without any local lesions, the existence of leishmaniform parasites being discovered only once at the points of inoculation. Parasites were, however, observed in the peripheral blood on various occasions, and after about 3 months the dog was destroyed when in very bad condition, the liver, spleen and bone marrow resembling very closely an infection of kala-azar, and revealing, besides many leishmaniform parasites, others that resembled *Herpetomonas,* but without flagella.

Nine guinea-pigs were inoculated ; 3 with cultures of *H. ctenocephali,* 3 with the variety of this parasite described by Chatton and 3 with cultures of *H. phlebotomi.* Among 8 inoculated in the peritoneum, only one died ; this was a very young animal inoculated twice at 3 days' interval with strong doses of *H. ctenocephali.* Leishmaniform parasites were observed in the blood during life and, after death, in the peritoneal exudate, liver, spleen and bone marrow. The other 7 animals inoculated in the peritoneum were destroyed, apparently in good condition, from 44 to 113 days after inoculation, while all were still infected. In each case a slight enlargement of the spleen was noticed at the autopsy and, in the peritoneum, and in stained smears from the liver, spleen and bone marrow, leishmaniform parasites, and elongated forms resembling *Herpetomonas* but without flagella. A mouse, inoculated with the peritoneal exudate from one of the guinea-pigs, died in four days. The ninth guinea-pig was inoculated in the right testicle with a culture of *H. ctenocephali* var. *chattoni,* and showed an infection limited to this organ, which, at the autopsy 117 days after inoculation, was found to be completely atrophied.

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BRUMPT (E.). **Au Sujet des Rapports entre l'*Onchocerca volvulus* et la Gale filarienne.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 7, 7th July 1920, pp. 535–539.

The author does not consider the identity of *Onchocerca volvulus* with the organism producing filarial mange, discussed in a preceding paper [*R.A.E.*, B, viii, 183], to be by any means proved, and he gives an account of the filarial form of dermatitis which is very widespread in Africa in regions where *O. volvulus* does not occur. He points out that if the identity were established, it should be possible to demonstrate that all persons suffering from this form of mange harbour adults of *O. volvulus*, and that all individuals with tumours due to *O. volvulus* show the eruption produced by the microfilaria. Many biological facts are quoted that throw doubt on the rôle of *O. volvulus* in filarial mange, and hoped it is that this point may shortly be elucidated.

DONATIEN (A.). **Gale du Dromadaire. Essais de Traitement par le Guetran (Goudron arabe) et par le Pétrole sulfo-carboné.** *Bull. Soc. Path. Exot., Paris*, xiii, no. 7, 7th July 1920, pp. 545–548.

In furtherance of the tests with wood-tar obtained from *Juniperus phoenicea* and *Thuya articulata* as a cure for mange in camels [*R.A.E.*, B, vii, 85 ; viii, 81] treatments were given to 11 camels suffering from mange that were intended to be used for laboratory experiments in the Pasteur Institute at Algiers and were necessarily kept under somewhat unhealthy conditions. Besides the wood-tar, treatments were given with 1 part carbon bisulphide dissolved in 3 parts of petroleum, the whole body of the animal being treated 3 times at 3 day intervals. The conclusion was reached that under the particular conditions of life to which these animals were subjected, wood-tar is inefficacious in curing mange, and at the most may serve to keep the animals alive. While carbon bisulphide and petroleum form a better antipsoroptic, they are not a radical cure.

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LEGER (M.) & TEJERA (E.). **Contribution à l'Etude du *Trypanosoma venezuelense*, Mesnil, 1910.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 7, 7th July 1920, pp. 576–588.

It was discovered many years ago that the epizootics known as "peste boba" and "desrengadera," which cause a high death rate among equines in Venezuela, are due to a trypanosome. The species implicated was at first thought to be *Trypanosoma equinum*, the causative agent of mal de caderas. Later F. Mesnil demonstrated that the Venezuelan flagellate is morphologically distinct from *T. equinum*, and while recognising its resemblance to *T. evansi*, the cause of surra, he described it as a new species, *T. venezuelense*. About the same time, *T. hippicum*, the causal agent of "murrina" in Panama, was described.

The study of trypanosomiasis among Venezuelan equines has been continued and the disease has been inoculated into various animals, including the guinea-pig, rat, grey mouse, horse, opossum, monkey and cattle. As a result of these investigations a good deal of fresh information is given on the morphology of *T. venezuelense*, its pathogenic power, its resistance to drugs, etc. The facts recorded and the

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experiments described indicate that the equine disease in Venezuela is not surra, and confirm the opinion of Mesnil that *T. venezuelense* constitutes a distinct species, which is morphologically allied to *T. evansi*, but must not be confused with it.

It would be interesting to follow a similar line of investigation with *T. hippicum*, the cause of " murrina " in Panama.

Parman (D. C.). U.S. Bur. Entom. **Observations on the Effect of Storm Phenomena on Insect Activity.**—*Jl. Econ. Entom., Concord, N. H.*, xiii, no. 4, August 1920, pp. 339–343.

Most of these observations were made on Muscids and related Diptera, including *Stomoxys calcitrans*, *Musca domestica*, *Cochliomyia* (*Chrysomyia*) *macellaria* and *Lyperosia* (*Haematobia*) *irritans*. With a rapidly falling barometer it was noticed that the flies became nervously active and then passed into a state of coma. During this state they are more subject to the action of destructive agencies. The mechanical action of the wind and sea spray are also probably responsible for the destruction of a large number of flies during a storm. About 15 days after a storm, a marked increase in the number of individuals has been noticed, the interval in question being the approximate duration of the immature stages of the species concerned. It was also noticed that insects attracted to lights are more active during high barometric periods and especially while the barometer is rising.

Zetek (J.). **The Control of Breeding of Yellow Fever Mosquitoes in Ant-Guards, Flower Vases and similar Containers.**—*Jl. Econ. Entom., Concord, N. H.*, xiii, no. 4, August 1920, pp. 344–350.

Much of the information on *Stegomyia fasciata* contained in this paper has been noticed elsewhere [*R.A.E.*, B, viii, 32].

Dohanian (S. M.). U.S. Bur. Entom. **Mosquito Control in a Southern Army Camp.**—*Jl. Econ. Entom., Concord, N. H.*, xiii, no. 4, August 1920, pp. 350–354, 3 plates.

The area of the work here described included the camp itself and about a three mile zone around it. The camp site was originally a cotton field with deep clay soil and only an occasional bed of sand or gravel protruding above the clay formation. Although almost uniformly level, there were depressions of varying sizes which retained rain-water for some time. The territory to the north, east, and south-east of the camp is devoted to cotton and truck garden crops, but to the west and south-west the rolling country is covered with mesquite and cacti.

All temporary pools of water in which mosquitos were found breeding were oiled with a combination of crude oil 70 per cent. and kerosene oil 30 per cent. To reduce mosquito breeding as much as possible in a creek that was in close proximity to the reservation, 50-gallon oil drums were used as drips. By this means the creek was supplied throughout the period of construction with a steady, uniform and very thin film of oil.

The mosquitos collected included: *Culex tarsalis*, *C. fatigans*, *C. spissipes*, *C. chrysonotum*, *C. similis*, *Psorophora jamaicensis*, *P. texanum*, *P. signipennis*, *Mansonia* spp., *Anopheles crucians*, *A. punctipennis*, and *A. pseudopunctipennis*. The last-named was found breeding throughout the summer months. *Culex fatigans* was the most prolific of the mosquitos and was found breeding from April to December.

As a result of careful inspection and subsequent treatment, *Stegomyia fasciata* (*Aëdes calopus*) was entirely absent during 1918, although a few individuals were taken at San Antonio, Texas, about 6 miles to the north-east.

Spooner (C. S.). **An interesting Case of Milk Contamination.**—*Jl. Econ. Entom., Concord, N. H.*, xiii, no. 4, August 1920, pp. 368–369.

Attention is called to the occurrence of a Phorid, *Aphiochaeta scalaris*, Tw., in milk in Georgia. The larvae of this fly have been recorded as attacking onions in the West Indies, living on decayed insects in Brazil and parasitising *Hyphantria cunea* in Florida.

*A. ferruginea*, Brunnetti, which, according to Malloch, is a synonym of *A. scalaris*, has been recorded as causing myiasis of the intestine in man, where it is able to complete its life-cycle. The presence of this fly in milk suggests a possible method of its reaching the human intestine.

de Vasconcellos (A.). **Da Piroplasmose bovina no Brasil.**—[Bovine Piroplasmosis in Brazil.]—*Brasil Agricola, Rio de Janeiro*, v, no. 6, June 1920, pp. 167–170.

This paper gives a clinical account of the disease.

Johnston (T. H.). **The Cattle Tick.**—*Science & Industry, Melbourne*, ii, no. 6, June 1920, pp. 347–351.

The cattle tick, *Boophilus annulatus australis*, occurs now in practically all parts of Queensland where climatic conditions permit its establishment. The life-history is described and the methods of control are briefly dealt with [*R.A.E.*, B, vii, 12, etc.]. The necessity for a widespread educational campaign to convince the population of the advisability of thorough tick eradication is emphasised.

Johnston (T. H.). **Flies as Transmitters of certain Worm Parasites of Horses.**—*Science & Industry, Melbourne*, ii, no. 6, June 1920, pp. 369–372.

Experiments have been made to determine whether any of the parasites, *Habronema muscae*, *H. megastoma* and *H. microstoma*, can complete their larval cycle in various Queensland flies, especially those that are commonly associated with horses and cattle. The species dealt with include: *Musca domestica*, L.; *M. fergusoni*, Jnstn. & Bancr.; *M. vetustissima*, Wlk.; *M. terraereginae*, Jnstn. & Bancr.; *M. hilli*, Jnstn. & Bancr.; *Stomoxys calcitrans*, L.; *Sarcophaga misera*, Wlk.; *Pseudopyrellia* sp.; and the common blow-fly, *Anastellorhina augur*, F. All these species were found able to harbour the larvae of one or more species of *Habronema* and to act as an intermediate host, and not merely as a mechanical carrier, of the parasites. *Musca* spp., *Sarcophaga* and *Pseudopyrellia* proved suitable as intermediate hosts for *H. muscae* and *H. megastoma*, but not for *H. microstoma*, whereas *Stomoxys* harboured only the latter species. Flies of various species that were heavily infested experimentally soon died. Similar phenomena probably occur under natural conditions, and this may account for the low percentage of parasitism among captured flies.

The buffalo fly, *Lyperosia exigua*, may also serve as a possible host for *H. microstoma.*

The larvae are able to escape from infested flies when the latter settle on mucous surfaces such as the mouth, nose, eyes, or even on sores and wounds. If the larvae escape into the mouth they will reach the stomach, where they develop to maturity after undergoing a series of moults. The larvae that are deposited elsewhere than in the mouth die off, but may first set up inflammation resulting in a granuloma or perhaps even swamp cancer.

The chief transmitters of equine granuloma are probably *Musca vetustissima*, *M. fergusoni* and *Stomoxys.* The house-fly may be mainly responsible for its occurrence in stabled animals.

Lienhart (R.) & Remy (P.). **Note sur la Présence en Lorraine d'*Argas reflexus* (Fabricius 1794) et Contribution à l'Etude de sa Biologie.**—*C.R. Soc. Biol., Paris*, lxxxiii, no. 26, 24th July 1920, pp. 1155–1156.

Attention is drawn to the finding an example of *Argas reflexus*, F., at Nancy University, taken at a window situated immediately beneath a pigeon loft. As this loft had been closed for six years, this is of interest in demonstrating the length of time this tick can subsist without food. Several individuals were subsequently found in the loft itself, and they were all vigorous in spite of their enforced starvation.

Mayne (B.). **Can the Mosquito convey Infection from a Malaria Patient undergoing Treatment ? Does Sporogony affect Mosquito Life ?**—*Public Health Repts., Washington, D.C.*, xxxv, no. 28, 9th July 1920, pp. 1664–1669, 2 figs.

The work of previous authors on this subject is reviewed. As a result of experiments made at New Orleans it is evident that when no change occurs in the morphology of the fully developed gametocyte in the presence of quinine, the development within the mosquito is not impaired by the drug. Mosquitos may become infected from the blood of patients that have previously received as much as 450 grains of quinine. Such mosquitos not only harbour the typical sporonts, but are also capable of infecting a healthy person. *Anopheles quadrimaculatus* was used for some of these observations. One example of this mosquito, fed occasionally on fruit juice, lived 185 days ; another fed on a patient infected with *Plasmodium vivax* retained a few apparently degenerate sporozoites in its salivary glands for 158 days.

The pandemicity of malarial fever may be partly accounted for by the longevity of the insect host, associated with its resistance to protozoan invasion. *Stegomyia fasciata* (*calopus*) infected with protozoa may live 154 days, but if it harboured microfilaria, a maximum of 17 days was observed.

Bishopp (F. C.). **The Stable Fly : How to prevent its Annoyance and its Losses to Live-stock.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1097, April 1920, 23 pp., 11 figs. [Received 30th August 1920.]

This is a revision of an earlier bulletin dealing with the life-history and habits of *Stomoxys calcitrans*, L. The best methods of protecting live-stock from this fly are discussed [*R.A.E.*, B, i, 96]. The Hodge fly-trap, specially designed for catching this pest, is described in detail. Since straw stacks have been found to be the chief breeding places of *S. calcitrans* in the grain belt, particulars are given of the best methods of disposal of straw and chaff and of making stacks.

Johnston (T. H.) & Bancroft (M. J.). **Notes on the Biology of some Queensland Flies.**—*Mem. Queensland Mus., Brisbane*, vii, pt. 1, 30th June 1920, pp. 31–43, 48 figs.

The species dealt with include *Musca terraereginae*, sp. n., the eggs of which are laid in cow-dung and horse-dung, and hatch in less than 24 hours. The larvae moult twice at intervals of 24 hours. Under laboratory conditions pupation takes place in damp sand after about 5 to 7 days. The pupal stage lasts from 7 to 10 days. This fly is parasitised by a flagellate, probably *Herpetomonas muscaedomesticae*, and by the Nematodes *Habronema muscae, H. megastoma*, and *Agamospirura muscarum.*

*Musca hilli*, sp. n., is occasionally found on horses and cattle, and is very similar in its habits to *M. terraereginae.* The larval stage occupies from 5 to 6 days and the pupal stage from 6 to 9 days, making a total of from 11 to 15 days, in January and February. It is parasitised by *Habronema muscae* and *H. megastoma.*

Other species dealt with include *Eumusca vetustissima*, Wlk. ; *Viviparomusca fergusoni*, J. & B. ; *Stenopterina gigas*, Macq. ; *Muscina stabulans*, Fall., which has been bred from rotting potatoes ; *Phaonia personata*, Wlk. ; and *Sapromyza fuscicornis*, Macq.

Wise (K. S.). **Malaria, the Problem of British Guiana.**—*Brit. Guiana Med. Annual for 1919 (22nd Year), Demerara*, 1919, pp. 1–28.

Malaria control in British Guiana consists essentially in limiting the breeding of Anopheline mosquitos, and this is far from impossible, though exceptional conditions favourable to *Anopheles* obtain. The inhabited area is a flat plain ; the soil is a heavy clay inpermeable to water ; the land level is 4–5 feet below high spring tides and therefore difficult to drain ; the rainfall is heavy—80 to 120 inches per annum ; there is a uniformly warm temperature all the year round—70° to 90° F. ; there are everywhere irrigation channels ; and vegetation is abundant.

Practical measures therefore resolve themselves into eliminating the grass or eliminating the water.

Cleare (L. D.), Junr. **Some Parasites of Man and Animals in British Guiana.**—*Brit. Guiana Med. Annual for 1919 (22nd Year), Demerara,* 1919, pp. 58–77.

This paper may be considered supplementary to a previous article [*R.A.E.*, B, v, 4], and represents an attempt to give a fairly complete list of animal parasites, exclusive of mosquitos, so far recorded from the Colony.

Chalmers (A. J.). **Oedema of the Eyelids caused by Ants.**—*Jl. Trop. Med. & Hyg., London,* xxii, no. 12, 16th June 1919, p. 117, 1 plate.

The observation recorded here confirms the author's suggestion [*R.A.E.*, B, vii, 6] that oedema of the eyelids in Europeans and natives in Khartum may be caused by an ant, *Monomorium bicolor,* subsp. *nitidiventre.*

Delmege (J. A.). **Some Practical Notes on the Prevention of Mosquito Breeding.**—*Jl. Trop. Med. & Hyg., London,* xxii, no. 19, 1st October 1919, pp. 181–184, 7 figs.

Some results are given of anti-mosquito work in Macedonia, chiefly effected during the summer of 1918.

Surface-drains should be deep (not less than 1 foot), narrow at the base, and with sloping sides. The sod along the edges should be turned back at least one foot, as this delays the re-growth of the grass. Spraying with cresol solution (about 1 in 500) also considerably delays vegetation. Stones on the edges of channels and streams should be avoided, as breeding takes place in the crevices, but large stones placed 4–6 inches from the edges are very useful in preventing the channel being trodden in by animals and men. For covering wells, etc., sacking on a wooden framework is suitable, but easily damaged. Corrugated iron is most unsatisfactory, as being almost impossible to make mosquito-proof. Light wood covers, carefully caulked, are the best.

All bushes and overhanging branches on streams should be cut back so as to permit a man to walk down the stream without touching them on either side. Streams running in sandy beds broken by rocks are best diverted. This also applies to streams through small marshes. In the case of partly stagnant streams in flat land the best method consists in digging a line of pits in the course of the stream at intervals of about 15 yards (the size of each pit and the distance between them varying much according to the nature of the ground); these pits can be kept clean and cresolised. Ponds for watering horses should be made, not by damming a stream, but by cutting a clean deep basin in one side of the channel.

Where an oil film is blown aside by winds or dispersed by frogs, petroleum is most unsatisfactory; a solution of cresol is preferable—1 in 100,000 in standing water and 1 in 1,000 (roughly) in slow-flowing streams. To make the solution, about equal quantities of cresol and water were used; a larger proportion of cresol mixes with difficulty. In dealing with gardens, horse-troughs, and pools used as decoy pools, it is essential that the dilution be as accurate as possible. The two following rough approximations were found exceedingly useful: area of circle = $\frac{3}{4}D^2$ (D = diameter); one ounce of cresol to 100 cubic feet of water gives a dilution of 1 in 100,000. Experience confirmed Mayne's conclusions [*R.A.E.*, B, viii, 90] that cresol does not spoil the water for animals or vegetable gardens. Reasoning from the life-history of the mosquito, the cresol solution should be added at intervals of from 7 to 10 days. In actual practice treatment was carried out twice a week. For small ponds the cresol is simply stirred in with sticks; for large ones, a board lying flat on the water steadied by a keel, and held by drag-ropes, can be pulled forwards and backwards; in streams the solution can be spread with a brush. Cresol is useless for drip-cans.

Decoy-pools, if carefully constructed and accurately treated with cresol in a 1 to 100,000 solution, were exceedingly effective. The only difficulty is to make the pools attractive to the mosquito, and in some instances all devices to induce oviposition were unsuccessful. A combination of constructional and larvicidal methods was generally used in the case of streams and pools. Three types of sprayer were in use: Mackenzie, Special Rapid, and Vermorel. The first-named was the best, its only real drawback being its tendency to become clogged, but this may be prevented by always washing out after use with cresol. For clearing, short-handled bill-hooks are the best.

The importance of trained supervisors is emphasised; for practical purposes a short course of five or six lectures with practical demonstrations proved sufficient.

DU TOIT (P. J.). **Gastruslarven und infektiöse Anämie der Pferde.** [Bots and Equine Infectious Anaemia.]—*Monatshefte f. praktische Tierheilkunde*, xxx, 1919, p. 97. (Abstract in *Schweizer Arch. f. Tierheilk., Zürich*, lxii, no. 1, January 1920, pp. 34–35.)

The typical reaction shown by a horse after injection with a watery extract of bot [*Gastrophilus*] larvae is regarded by the author as toxic in nature, and not anaphylactic. Repeated injections caused a gradual intoxication, as shown by loss of condition, decrease in the number of red blood corpuscles and dullness, but the febrile attacks, as in infectious anaemia, never occurred. From numerous experiments the author concludes that there is no relation between bots and infectious anaemia.

TODD (J. L.). **Concerning Immunity to Human Trypanosomiasis.**—*New Orleans Med. & Surg. Jl., New Orleans*, lxxii, no. 5, November 1919, pp. 293–295.

There is no history or tradition of a time when trypanosomiasis was not endemic and universal in the Gambia. In 1911 about 0·8 per cent. of the population was infected; *Glossina palpalis* and *G. morsitans* are widely distributed, and are often very numerous. The natives' manner of living does not particularly expose them to bites; their villages, grazing grounds and farms are usually at some distance from the water. They are prosperous and well able to resist disease. The method of searching for trypanosomiasis was such that cases doubtless are missed. None the less these factors are not sufficient to explain why only 0·8 per cent. of the population was infected. In 1902, Dutton and the author suggested that an immunity to human trypanosomiasis does exist, and it is here submitted that additional proof of the presence of some degree of immunity is afforded by the good health at the end of 1918 of four natives who, in 1911, were shown to harbour trypanosomes.

Rizzi (M.). **Malaria debellata in Trinitapoli.** [Malaria conquered in Trinitapoli.]—*La Malariologia, Naples,* Ser. I, xii, no. 1–3, 30th June 1919, pp. 47–53.

This is an account of a vigorous anti-mosquito campaign carried out in 1917–1918 at Trinitapoli in southern Italy. Whereas 196 deaths occurred in the town in 1916, this figure fell to 52 in 1917, and 8 in 1918.

Parsons (A. C.). **Practical Notes on Mosquito Surveys of Camps and Barracks during 1917 and 1918.**—*War Office. Observations on Malaria; London,* H.M. Stationery Office, December 1919, pp. 95–131, Price 6*s.*

This is a detailed and instructive account of the work done in military stations and camps in England. The places visited are listed as an appendix. The scheme adopted is described, and notes on Anophelines are given. *A. maculipennis* was the commonest species ; *A. bifurcatus* was much less frequently met with ; *A. plumbeus* was not found in houses or animal sheds. In spring the males are the first to appear ; during the summer females preponderate indoors ; in autumn, males are seen in company with females.

Robertson (J. C.). **A short Report on the Anti-Malaria Campaign at Taranto during 1918.** *War Office. Observations on Malaria; London,* H.M. Stationery Office, December 1919, pp. 149–177, Price 6*s.*

For many reasons the destruction of mosquitos at a large rest camp formed at Taranto in 1917 became almost the sole protection available [*R.A.E.*, B, viii, 139]. *Anopheles maculipennis,* numerous in the ditches and marshes, and *A. bifurcatus,* in the wells and troughs, were the species found, and the former was more often a carrier of malaria than *A. bifurcatus.*

Macdonald (A.). **Report on Indigenous Malaria and on Malaria Work performed in Connection with the Troops in England during the Year 1918.**—*War Office. Observations on Malaria; London,* H.M. Stationery Office, December 1919, pp. 178–258, 20 plates, 1 map. Price 6*s.*

The chief of the " dangerous areas " scheduled by the War Office embraced Romney Marsh, Sandwich, Sheppey, and Isle of Grain. The probable date of infection in 47 out of the 61 cases observed in 1918 in England was August. In every case *Anopheles maculipennis* was found in the huts, and its breeding-places were near by. *Plasmodium vivax* was the parasite in all cases. *A. maculipennis,* which may be looked upon as the chief carrier of malaria in England, is found in buildings and sheds occupied by stock, and is most numerous in September. Larvae have been taken from April to September. They abound in the stagnant water of the marsh-country dykes, and the vegetation protects them against the stickleback (perhaps the most valuable enemy of *A. maculipennis* in estuarine dykes) and other fish. In the marsh and estuarine dykes they are found in waters with a salinity ranging from 16·5 to 339 parts of chlorine per 100,000. *A. bifurcatus*, which is essentially not a domestic mosquito, is a less likely transmitter than *A. maculipennis.* Its larvae have not been found in the brackish estuarine dykes, nor in water overgrown with surface vegetation. Adults occur from March to October, and larvae throughout the year. At Uckfield, where the occurrence of a case of indigenous malaria is recorded, there is a possibility of the occurrence of *A. plumbeus* on account of the presence of many beech trees with numerous tree-holes, but as *A. maculipennis* was found, search for *A. plumbeus* was not made at the time the case was investigated. In addition to *A. maculipennis*, *Culex pipiens* and *Theobaldia annulata* are found frequently under domestic conditions.

As regards the relation of shade to mosquito breeding, Anopheline larvae in England may be said to be the frequenters of open, weed-grown water. The isolated shade of a tree, bridge, etc., is no hindrance to breeding provided that other conditions are favourable. Larvae of *Ochlerotatus* and *Theobaldia* have been found in abundance in shady situations, and those of *Culex pipiens* were observed in complete darkness.

The anti-malaria measures carried out are described in detail. Screening the huts occupied by carriers, subsequent removal of carriers from Anopheline areas, winter destruction of imagines, and cleaning of dykes were the chief protective measures employed.

Raabe (H.). **Studja nad Muchą domową.** [A Study of the House-fly.]—*Przegląd Epidemjologiczny, Warsaw*, i, no. 1, 1920, pp. 45–55. [With a summary in French.]

These biological studies were made in autumn and winter. According to the author it is chiefly the eggs, larvae and pupae of *Musca domestica* that hibernate. The larvae are very resistant to cold. The adults are unable to hibernate in a torpid condition ; they always require water and a temperature above freezing point. For this reason most of them die in winter.

Knuth (P.), Behn (P.) & Schulze (P.). **Untersuchungen ueber die Piroplasmose der Pferde im Jahre 1917.** [Experiments on Equine Piroplasmosis (Biliary Fever) in 1917.] *Zeitschr. f. Veterinärk.*, 1918, no. 6, pp. 241–264, 3 plates. (Abstract in *Trop. Vet. Bull., London*, viii, no. 1, March 1920, pp. 6–12.)

These investigations were carried out in the areas occupied by the German troops in Macedonia in 1917 with the object of finding out whether the return of horses affected with piroplasmosis into Germany would constitute a source of danger for the equine population there, inasmuch as the possibility of transmission by the ticks found in

Germany had to be reckoned with. Transmission experiments by du Toit with *Ixodes ricinus* in Berlin point to the improbability that *Nuttallia equi* can be transmitted by this tick [*R.A.E.*, B, viii, 151].

Fifteen species or varieties of ticks belonging to the family IXODIDAE were found in Macedonia. Twelve of these were found in the adult stage on horses, viz., *Ixodes ricinus*, *I. hexagonus dardanicus*, P. Schulze, *Hyalomma aegyptium*, L., *H. aegyptium impressum*, Koch, *H. scupense*, P. Schulze, *Haemaphysalis inermis*, Birula, *H. cinnabarina punctata*, Can. & Fanz., *H. otophila*, P. Schulze, *Dermacentor reticulatus*, F., *Rhipicephalus sanguineus*, Latr., *R. bursa*, Can. & Fanz., and *Boophilus annulatus*, Say.

The following were found in the nymphal stage on horses : *I. ricinus*, *H. scupense*, *Haemaphysalis cinnabarina punctata*, *B. annulatus*, *D. reticulatus*, and *R. bursa*. No species in the larval stage was found on the horse, but the earlier stages were generally to be found on the smaller animals.

On horses suffering from piroplasmosis only three species were found, viz., *Hyalomma aegyptium*, *Rhipicephalus bursa*, and *R. sanguineus*. It is improbable that the first-named acts as a vector, but the evidence points to one or perhaps both of the others being incriminated, as another species of the same genus, *R. evertsi*, Neum., has been proved to transmit *Nuttallia* in the horse. It is probable that *R. bursa*, which was found in large numbers in the nymphal stage on the horses, was the species especially responsible.

*Dermacentor reticulatus* was only found in the earlier part of the year (up to 4th June) on horses, and only re-appeared in very small numbers in the late autumn. This species has been considered to be the transmitter of *Piroplasma* (*Babesia*) *caballi* in South Russia, and the frequent occurrence of both *D. reticulatus* and babesiasis in the spring in Macedonia also point to a causal relationship.

A small quantity of smear preparations and ticks were received from Rumania. *Piroplasma caballi* was found in one case. The ticks were *I. ricinus*, *H. cinnabarina punctata*, *H. otophila*, *D. reticulatus*, and *R. bursa*. From reports received it appeared that infection with *P. caballi* was far more common in Rumania than with *Nuttallia equi*, but that the total number of cases of piroplasmosis occurring in that country was smaller than in Macedonia.

ROYER (B. F.) & EMERSON (C. A.). **Mosquito Eradication in South-eastern Pennsylvania.**—*Amer. Jl. Public Health*, ix, no. 5, 1919. (Abstract in *Trop. Dis. Bull., London.*, xv, no. 2, 14th February 1920, p. 157.)

The operations here described aimed at reclaiming from mosquitos a vast extent of marsh, mostly below high-water mark, along the Delaware River. While drainage work was in progress, a comprehensive system of oiling was carried out. The result of the operations was that complaints about mosquitos became almost unknown, and large areas are available for cultivation.

The mosquitos in the district include *Anopheles punctipennis* and *A. quadrimaculatus*. The predominant species during early summer was *Aëdes sylvestris*, and after 1st July, *Culex pipiens*.

Samsonoff (—). **Intoxication des Ruminants par les Sécretions du Criquet pélerin.** [Poisoning of Ruminants by the Secretions of the Migratory Locust.]—*Rec. Méd. Vét.*, xcv, no. 19, 15th October 1919, pp. 556–563. (Abstract in *Trop. Vet. Bull., London,* viii, no. 1, March 1920, pp. 91–92.)

In the spring of 1915 great ravages were wrought in Palestine and Syria by dense swarms of migratory locusts, and in May an extremely severe disease, apparently due to an intoxication, was noted among cattle, sheep and goats. Similar symptoms were stated to have occurred in cattle, buffalos, and especially sheep, after eating some sorghum leaves that had previously been attacked by locusts. Sorghum and sesame are the only green plants found in May in the country. It is well known that animals can consume dead locusts without harmful effects. In the Hedera district the domestic animals are watered at artificially dug wells. Some of these were completely filled with the dead locust larvae, in others they were less numerous and their secretions had given a greenish yellow colour to the water. Evidence is given in support of the view that the poisoning in cattle watered at these wells was actually due to the secretions. Cattle did not become affected after drinking from wells that had been covered to exclude locusts, or from streams. Symptoms also were noted in the individual animals that drank first from a polluted well ; those drinking subsequently, when clean water had run in, were not affected.

Eisner (G.). **Zur Erklärung der Tertianaanfälle nach Tropikalinfektion. Gegen die Annahme der Einheitlichkeit der Malariaparasiten.** [The Explanation of Benign Tertian Cases following Infection with Tropical Malaria. Controversion of the Unitarian Theory.]—*Berl. Klin. Wochenschr., Berlin.* lvi. no. 17, 28th April, 1919. pp. 394–395. (Abstract in *Trop. Dis. Bull., London,* xv. no. 2, 14th February, 1920, p. 96.)

After several years' experience of malaria in Macedonia. the author rejects the theory that there is only one species of malarial parasite.

Cases of benign tertian (*Plasmodium vivax*) in persons who in the previous summer had suffered only from tropical malaria are readily explained by the former remaining latent for long periods. Quinine prophylaxis is able to keep benign tertian malaria in subjection, but often fails to suppress infection with *P. praecox* (*falciparum*) ; the latter is therefore first in evidence in cases of double infection.

Again, in Macedonia, tropical malaria was acquired late in summer when quinine prophylaxis had become slack, so that *P. praecox* had a better chance of establishing itself than *P. vivax*, infection with which occurred earlier, at a time when the prophylaxis was better carried out.

The author advances the hypothesis that a tropical infection may actually prevent the development of a benign tertian infection.

Other facts that disprove the unitarian theory are the morphological and histological differences in the parasites, the differences in the types of fever they produce, and the numerous specific epidemiological and clinical features that distinguish benign tertian from tropical malaria. These points are discussed in some detail.

SIMONS (H.). **Malaria-Erfahrungen und kritische Studien über den Unitarismus.** [Experience with Malaria and Critical Studies of the Unitarian Theory.]—*Berl. Klin. Wochenschr., Berlin,* lvi, nos. 43–44, 27th October–3rd November 1919, pp. 1009–1012, 1041–1043, 3 figs. (Abstract in *Trop. Dis. Bull., London,* xv, no. 4, 15th April 1920, pp. 250–252.)

The second part of this paper, in which numerous references to the literature are given, is a careful criticism of the unitarian theory. The author points out that this theory, which is concerned with a morphological question, depends chiefly, not on morphological findings, but on epidemiological and clinical proofs. The evidence obtained from mixed infections is against the unitarian theory, and in such cases faulty staining may lead to fallacious conclusions.

DUNN (L. H.). **Studies on the Screw-worm Fly,** *Chrysomyia macelaria* **in Panama.**—*Proc. Med. Assoc. Isthmian Canal Zone, Mount Hope, C.Z.,* x, pt. 2 (July–December 1917) 1919, pp. 33–66. [Received 2nd September 1920.]

The bulk of the information contained in this paper on *Cochliomyia* (*Chrysomyia*) *macellaria* has already been noticed from another source [*R.A.E.*, B, vi, 148].

CONNOR (R. C.). **Relapsing Fever—Its Occurrence in Panama and a Report of Recent Cases treated in Ancon Hospital.**—*Proc. Med. Assoc. Isthmian Canal Zone, Mount Hope, C.Z.,* x, pt. 2 (July–December 1917) 1919, pp. 67–76. [Received 2nd September 1920.]

The causes and diagnosis of recurrent fever caused by *Spirochaeta recurrentis* are discussed with a short note on treatment and a report of cases in Panama.

There are four types of relapsing fever :—African tick fever ; the Asiatic or Indian type ; the European type ; and the American type.

The disease in North Africa is thought to be transmitted by vermin, particularly lice. The work of investigators on this head is reviewed [*R.A.E.*, B, i, 70, 235 ; ii, 90, 91, 200 ; iii, 33, etc.].

In Panama possible transmitters are ticks, lice and mosquitos, but conditions that favour extensive spread of the disease, such as war, famine, overcrowding or uncleanliness, are absent.

DUNN (L. H.). **Report on the Mosquitoes caught by Hand in the Canal Zone from February 1st, 1916, to January 31st, 1917.**—*Proc. Med. Assoc. Isthmian Canal Zone, Mount Hope, C.Z.,* x, pt. 2 (July–December 1917) 1919, pp. 145–169. [Received 2nd September 1920.]

This report explains the method of systematic mosquito catching by hand in habitations on the Canal Zone, and gives a census of all the mosquitos caught in this manner in each locality from 1st February 1916 till 31st January 1917. The work is done by trained negroes with large test tubes containing a pad soaked in chloroform. In all, 391,019 mosquitos were caught in the year, of which 251,332 were *Taeniorhynchus* (*Mansonia*) *titillans*; of Anophelines, *Anopheles albimanus* was far the most numerous, the others being, in order of frequency, *A. tarsimaculatus*, *A. malefactor*, *A. pseudopunctipennis*, *A. apicimacula*, and *A. argyritarsis*.

Hand-catching has not only proved economical, practical, and successful in the considerable reduction of malaria cases, but also, in its results, acts to a certain extent as an index to the breeding places. In the event particularly of *Stegomyia fasciata* (*Aëdes calopus*) making its appearance in the catch, it is generally taken as an indication that it is breeding in the immediate vicinity, as this species seldom breeds far from human habitations. Steps are then taken to locate the breeding place, which usually proves to be some old tin can or similar receptacle, and when found is easily abolished.

HAROLD (C. H. H.). **Relapsing and Mianeh Fevers in East Persia.**—*Jl. R.A.M.C., London*, xxxiv, no. 6, June 1920, pp. 484–498.

WRIGHT (H. D.) & HAROLD (C. H. H.). **Tick Fever in East Persia.**—*Ibidem*, xxxv, no. 3, September 1920, pp. 203–217.

These papers give an account of various outbreaks of tick fever among Indian troops and their officers in East Persia. The men were attacked by two species of tick, *Argas persicus* and *Ornithodorus lahorensis*, when occupying Persian serais. The majority of the cases were absolutely free from lice. Some of the men who were bitten by ticks did not develop the disease. It seems probable that the disease is developed on the eighth day after it is transmitted; at any rate the incubation period is from one to twelve days.

Spirochaetes are few and difficult to find, in contrast to what occurs in the recurrent fever carried by lice. In this the disease resembles African tick fever, but the spirochaetes of the two diseases are somewhat different in form. In Persia as in Africa the local natives are immune to the disease, but strangers are susceptible.

THOMPSON (A. G. G.). **Disinfestation in the German Army in the War.**—*Jl. R.A.M.C., London*, xxxv, no. 3, September 1920, pp. 228–232, 2 plans.

A description is given of the combined bathroom and delousing apparatus used in the German Army for troops when relieved from the line. The heating for both bathroom and disinfector came from the same furnace; the men passed through the former parallel with their clothes passing through the latter, receiving their clothes clean on the other side. The clothing was left in the disinfector at a temperature of 100° C. dry heat for one hour. Where convenient it was found that baking the clothes for two hours at 80° C. gave better results.

Other methods of treatment mentioned are hydrocyanic acid gas, sulphur dioxide combined with dry heat, and steam wagons, and a plan is given of a bath-house and disinfector suitable for barracks. As a prophylactic, crude naphthaline was issued at first, but irritated the skin too much. A half and half mixture of powdered talc and naphthaline was afterwards issued, but this was also too strong and was never in general use. Treatment for scabies consisted of baths and an ointment of balsam of Peru.

Sambon (L. W.). **Tropical and Sub-Tropical Diseases.**—*United Empire, London,* N.S., xi, nos. 8 & 9, August & September 1920, pp. 420–431 & 493–503.

This paper read at a meeting of the Royal Colonial Institute reviews the history of many tropical and sub-tropical diseases, with special reference to insect transmission. Many previous authors are quoted, and their work is discussed.

Duncan (M.). **On Acari from the Lungs of** ***Macacus rhesus.***—*Jl. R. Microsc. Soc., London,* 1920, part 2, June 1920, pp. 163–168, 1 plate, 2 figs. [Received 7th September 1920.]

Attention is drawn to the occurrence of an Acarid, *Pneumonyssus foxi,* in the lungs of a monkey (*Macacus rhesus*). The whole life-cycle is apparently passed in this environment, but how the mite originally gains entrance to the lungs of the host has not yet been definitely ascertained. [See also *R.A.E.*, B, iv, 40.]

Sinclair (J. M.). **Southern Rhodesia : Report of the Chief Veterinary Surgeon for the Year 1919.**—*Salisbury,* 1920, pp. 1–8. [Received 7th September 1920.]

The number of fresh outbreaks of African coast fever in Rhodesia during 1919 was eight, and the mortality 798 head. The heavy mortality attending the outbreaks in two localities in which dipping had been constantly practised led to a good deal of criticism of the system. In one of these cases the mortality during the first four months was 437 head as against only nine during the next four. The degree of infection to begin with was one of the heaviest that has ever had to be dealt with, and but for dipping, less than 10 per cent. would have survived three months. In the second case over 50 cattle actually suffering from the disease were deposited by rail on three farms where tick infestation was at a minimum as the result of regular dipping over a considerable period. The results were disappointing, as over 266 head out of 615 contracted the disease and died, or were destroyed. The mortality was heaviest among the working oxen, and it has been suggested that this was due to the rapid elimination of arsenic from the skin as the result of the constant daily exertions. There is probably something in this view, but the high mortality generally was due to the fact that the imported infected cattle were heavily tick-infested on arrival, and apparently were not dipped until a week later. In connection with this outbreak it has been alleged that the methods were at fault in that dressing of the ears and tails was not carried out. These processes have not been insisted on in cases where dipping has been regularly practised, and there is nothing to show that the subsequent mortality has consequently been increased. Records show that, whatever the methods of dipping, etc., the period required to eradicate infection depends entirely on the degree of infection in existence to begin with.

During 1919, 229 dipping tanks were constructed, making a total of 1,583, but many are still required for the proper carrying out of the Cattle Cleansing Ordinance (1918).

Anaplasmosis (gall-sickness) and piroplasmosis (red-water) caused a considerable mortality, chiefly amongst pure-bred and grade animals. An increase in the prevalence of these diseases is to be attributed to increased tick activity, the result of ineffective dipping, and the relatively greater susceptibility of pure and grade stock resulting in an exaltation of the virulence, particularly of gall-sickness, by passage through them.

A number of fatal cases of trypanosomiasis occurred amongst cattle in various districts, but reliable statistics are not available.

Myiasis, produced through infestation with the larvae of certain flies [*Chrysomyia*], has been recorded from practically every district in the territory since 1918. It is most prevalent during the summer, and in districts with heavy rainfall, but is not infrequently seen during the winter. The maggots should be destroyed by dressing the wound with a volatile agent such as carbon bisulphide. To prevent further infestation, the wounds and surrounding skin should be dressed with an emulsion of Stockholm tar containing a small quantity of iodoform in solution, and finally the application of dry wood-ashes or lime. To reduce the flies as much as possible, every maggot should be destroyed and all carcases buried deeply or burned.

BEVAN (LL. E. W.). **Report of the Veterinary Bacteriologist.**—*S. Rhodesia, Rept. Chief Vet. Surgeon for 1919, Salisbury,* 1920, pp. 9–17. [Received 7th September 1920.]

Myiasis in cattle [*R.A.E.*, B, vii, 60] is caused by the larva of a fly closely resembling *Chrysomyia* (*Pycnosoma*) *albicans*. The eggs are laid on or near any abrasion on the animal, and the larvae bore into the tissues below and form large cavities, which are not perceived for some time, until a considerable area of skin sloughs and exposes them. The commonest site of infection is in the soft tissues round the anus and vulva, positions favoured by *Hyalomma aegyptium*, a tick that is believed often to cause the primary injury.

Cure, by dressing the wounds with volatile agents, tar, etc., is often difficult, and it is very desirable that methods of attacking the fly itself should be discovered.

With regard to the high mortality from African coast fever suffered by oxen as compared to other cattle, and to the fact that animals that have shown manifestations of the disease have apparently recovered in the dry season, but have died of an acute form during the rains, it is suggested that the development of the parasite is checked in animals highly impregnated with arsenic. The possibility of a suppressed form of African coast fever as the result of short-interval dipping is a matter deserving the closest investigation.

SHAND (W. R.), DALTON (J.) & HUNTLEY (H. G. M.). **Southern Rhodesia Report of the Committee of Enquiry in respect of African Coast Fever.**—*Salisbury*, 1920, 12 pp.

Recent outbreaks of African coast fever in various districts of Southern Rhodesia are described, and suggestions are made for amendments and additions to be incorporated in the present laws and regulations dealing with this disease. The recommendations made are very similar to those noticed in connection with a recent report from the Union of South Africa [*R. A. E.*, B, viii, 178].

Hodge (C. F.). **The Mosquito-Malaria Problem in Florida.**—*Florida Entom., Gainesville*, iv, no. 1, July 1920, pp. 1–6.

The importance of paying more attention to the domestic breeding places of mosquitos such as rain-tubs, etc., is emphasised. It is considered that if such places were rendered harmless by individual enterprise, mosquitos could be effectively held in check by the existing natural enemies in Florida.

The only way of attracting the attention of the public to the importance of such measures is to provide adequate and universal science lessons in every school in Florida.

Imes (M.). **Hog Lice and Hog Mange. Methods of Control and Eradication.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1085, May 1920, 28 pp., 12 figs. [Received 11th September 1920.]

The parasites of pigs here dealt with are *Haematopinus suis, Sarcoptes scabiei suis* (causing sarcoptic or common mange) and *Demodex folliculorum suis* (causing demodectic or follicular mange). There are five methods of applying treatment; hand applications, spraying, rubbing posts, medicated wallows, and dipping. Hand applications may be made with crude petroleum, cotton-seed oil and kerosene in equal parts, or kerosene and lard, half a U.S. pint to a pound. Spraying is effective if thoroughly carried out, but dipping with the same materials is usually more economical and more successful. Rubbing posts have already been noticed [*R.A.E.*, B, v, 75; vi, 94]. Shallow concrete wallows, with a layer of crude petroleum floating on the water, and shaded from the sun, are effective in hot weather. The wallow should not be kept medicated continually, but only at intervals of a week or ten days, and it should not be medicated till the pigs have become used to it.

Crude petroleum also makes the most effective dip—in fact the only one that will eradicate both lice and mange with one dipping. Lime-sulphur, coal-tar-creosote, and arsenical dips may also be used, if desirable, but they involve much greater expenditure of time and labour.

Instructions are given for making up the various dips, and also for constructing dipping plants, wallows, and rubbing posts, calculating the cubical contents of tanks, etc.

Lahille (F.). **Enumeración sistemática de los Pediculidos, Malófagos, Pulícidos, Linguatúlidos y Acaros (1a Parte) encontrados en la República Argentina con una Nota sobre un Especie de Piojo de las Ovejas.** [Systematic Enumeration of the Pediculids Mallophaga, Pulicids, Linguatulids and Acarids (1st Part) found in the Argentine Republic, with a Note on a Species of Sheep Louse.]—*Minist. Agric. Nac., Buenos Aires*, 1920, 41 pp., 4 plates.

Among the parasites enumerated in this list as occurring in Argentina, a special list is given of the Mallophaga infesting birds, comprising 14 genera and some 159 species, and it is thought probable that many more occur in the country.

Notes are also given on the sheep-louse, *Linognathus pedalis*, Osb., which is reported as very abundant in the Province of Buenos Aires.

The eggs are laid close to the base of the hairs on the lower extremities of the limbs. The appearance and measurements of the eggs and nymphal forms are described. As the eggs are always located about the feet of the animals, they can easily be dealt with ; in summer the ordinary baths given for mange are efficacious, and in winter the animals should be walked through a parasiticide solution, wetting only the feet.

SMYTH (E. G.). **Dominio de la Plaga de la Mosca del Ganado en Puerto Rico.** [Control of the Horn-fly Pest of Cattle in Porto Rico.]—*Rev. Agric., Puerto Rico, San Juan,* iii, nos. 5 & 6, October and November 1919, pp. 10–24, 17–28, 4 plates.

Considerable loss occurs to owners of cattle in Porto Rico from *Lyperosia irritans,* L. (horn-fly), which was introduced about 15 years ago. This arises from a reduction in the yield of milk and in working power owing to molestation by this fly interfering with proper grazing. It is especially abundant during or following the rainy season, but the damage it does is most noticeable in the dry, south coast districts, where the grass is of poor quality and the fly numerous. The adult fly spends almost all its life on the cattle, only leaving them for brief periods to deposit its eggs on the manure. Under favourable circumstances the life-cycle may occupy only two weeks.

The information that has been gained in various countries on the transmission of disease by *L. irritans* [*R.A.E.,* B, vi, 181, etc.] is reviewed. A number of formulae for repellents and sprays that have been tried in different places is given with notes on the natural enemies of this fly in various countries.

In Porto Rico some of the birds useful in this connection are a humming bird (*Anthracothorax aurulentus*), the Jamaican cliff swallow (*Petrochelidon fulva poeciloma*) and several flycatchers and warblers. Large numbers of fly larvae have been found in the stomach of a sandpiper (*Pisobia minutilla*), and the Porto Rican blackbird (*Holoquiscalus brachypterus*) is especially useful in scattering the cattle dung and incidentally eating or otherwise destroying the larvae and pupae.

The attempted introduction of parasites of this fly is recommended on the lines that have been successful in Hawaii [*R.A.E.,* B, v, 137, etc.].

PILLERS (A. W. N.). **Some accidental Parasites of the Ear of the Domesticated Rabbit and Guinea-Pig.**—*Vet. Jl., London,* lxxvi, no. 9, September 1920, pp. 331–334, 5 figs.

The mites found infesting ears of rabbits and guinea-pigs include *Glycyphagus domesticus,* deG., *Tyroglyphus* (*Aleurobius*) *farinae,* Gerv., and *Cheyletus eruditus.*

SPLENDORE (A.). **Sui Parassiti delle Arvicole.** [The Parasites of the Field Rat, *Pitymys savii.*]—*Ann. d'Igiene, Rome,* xxx, no. 8, August 1920, pp. 445–468, 6 plates.

The insect parasites of the important agricultural pest, *Pitymys savii,* are the fleas, *Ceratophyllus fasciatus,* Bosc., *Typhlopsylla assimilis* (?), Taschb., and *Hystrichopsylla tripectinata,* Tirab., a louse, *Hoplopleura acanthopus,* Burm., and the mites, *Myobia* sp. (?) and *Leiognathus albatus,* Berl.

Piccininni (F.). **Osservazioni epidemiologiche ed anatomo-patologiche nella Peste dei Ratti. Ricerche sperimentali sulla Immunità dei Ratti contro la Peste.** [Epidemiological and Anatomopathological Observations on Rat Plague. Experimental Research on the Immunity of Rats against Plague.]—*Ann. d'Igiene, Rome,* xxx, no. 8, August 1920, pp. 484–496.

The brown rat, *Mus decumanus,* represents 90 per cent. of the rat population in and around Naples, and 90 per cent. of the infected rats belonged to that species. The black rat, *Mus rattus,* and its variety, *Mus alexandrinus,* are the other species, together with *Mus musculus,* which latter, however, is of little importance as a plague carrier. Though plague occurs among the rats in the harbour at Naples, most of them are immune. This immunity probably obtains in all the great traffic centres, and is a powerful check that prevents the spread of plague and finally extinguishes it. If rat plague is conveyed from a harbour to the surrounding city, its spread is greatly facilitated owing to the non-immunity, or slowly acquired immunity, of the town rats that inhabit and move about in a very large area, whereas a harbour zone is limited in extent. This renders more urgent still the necessity for separating a harbour sewage system from that of the surrounding town, as laid down in regulations governing harbour sanitation, thus reducing the opportunities that harbour rats have for entering the town area. The sewer system of the "free harbour" portion of the port of Naples is thus separated, and it is urged that the entire port should be dealt with on these lines.

Stempell (W.). **Ueber den Erreger des Fleckfiebers.** [The Causal Agent of Recurrent Fever.]—*Sitzungsber. Naturh. Ver. d. preuss. Rheinlande u. Westfalens, 1919 (1917–1919)*; *Bonn,* 1920, B, pp. 3–7, 22nd October 1919.

In reviewing the question of the causal agent of recurrent fever, the conclusion is arrived at that nothing really definite is known except that this organism undergoes several days' development in the louse. It is a fact that epidemics of recurrent fever usually occur in winter and that this disease is not met with in the tropics. The digestive processes in the louse, especially intestinal action, are very dependent on the temperature of its surroundings. Hase has pointed out that at high temperatures an interval of only 2 minutes elapses between ingestion and defecation. It is therefore possible that the slow digestive process entailed by cold weather is necessary to permit the parasites to settle and develop in the gut. This may well be one of the factors responsible for the occurrence of recurrent fever in the cold season.

Flu (P. C.). **Onderzoek naar de Levensduur van** ***Stegomyia fasciata*** **bij lage Temperaturen.** [An Investigation of the Length of Life of *S. fasciata* at low Temperatures.]—*Geneesk. Tijdschr. Nederl.-Indië, Weltevreden,* lx, no. 3, 1920, pp. 418–423.

These results were obtained in experiments carried out in the cold storage chambers of a steamer. A temperature just beneath freezing point is certain to kill *Stegomyia fasciata* in 24 hours. In a chamber in which the temperature did not rise above 6° C. [42° F.] the same result occurred. At a temperature oscillating between 7° and 10° C. [44°–50° F.] the mosquitos soon become torpid, but do not die for at least 4 days. There is a very slight chance of life, unless the temperature remains constant at over 6° C. [42° F.] and exposure is shorter than 6 days. In view of the long voyage and the need for maintaining a temperature beneath 6° C. there is no danger that infected *Stegomyia* can be brought alive from the west coast of South America to the Dutch East Indies. It is important that the temperature in the storage chambers be carefully checked, and for this purpose a self-registering thermometer is recommended. A thorough examination of other parts of a vessel is very necessary.

Plehn (A.). **Zur Lehre von der Einheit der Malariaerreger.** [The Unitarian Theory of the Causal Agent of Malaria.]—*Arch. f. Schiffs.- u. Trop.-Hyg., Leipsic*, xxiv, no. 8, September 1920, pp. 225–227.

This paper disputes the accuracy of Martini's criticism of the unitarian theory [*R.A.E.*, B, viii, 169].

Howard (L. O.). **Mosquitoes and Bats.**—*Public Health Repts., Washington, D.C.*, xxxv, no. 31, 30th July 1920, pp. 1789–1795.

The value of bats as destroyers of mosquitos in general, and in particular the efficacy of bat roosts like those described elsewhere [*R.A.E.*, B, i, 176] are considered. Evidence is cited showing that mosquitos do not form a large proportion of the diet of bats, that only a very few species of bat are gregarious, and that no diminution of the numbers of mosquitos or of the amount of malaria was observed in places where bats were swarming, while as far as New Jersey and Pennysylvania are concerned, no bat occurs that forms very large colonies. Finally it is considered that bat roosts are not sufficiently promising to justify the expenditure of public money on them.

Green (H. H.) & Dijkman (C. D.). **Some Experiments on the Fate of Arsenic in the Animal Body.**—*Union of S. Africa Dept. Agric., 7th and 8th Repts. Direct. Vet. Res., April 1918, Cape Town*, 1920, pp. 689–698.

As the result of a number of experiments on the fate of arsenic in the animal body, it was found that the amount of arsenic eliminated by the kidneys after dipping and the amount retained in the skin and hair of dipped animals seem to have been greatly overestimated by previous workers. Experiments in oral dosing and intravenous injection were made in order to trace the methods of elimination in various animals, and to find the distribution of arsenic in the tissues and the amount of the toxic dose.

Green (H. H.) & Kestell (N. H.). **Behaviour of Bacteria towards Arsenic.**—*Union of S. Africa Dept. Agric., 7th and 8th Repts. Direct. Vet. Res., April 1918, Cape Town*, 1920, pp. 701–706.

In the experiments here described, although over a dozen different species of arsenic-resistant bacteria were examined, only two showed any chemical activity towards arsenic, viz.:—the earlier described *Bacterium arsenoxydans* [*R.A.E.*, B, viii, 6] which oxidises arsenite to arsenate, and *B. arsenreducens* [*loc. cit.*, viii, 7] which reverses this process. The others were merely tolerant. There is no discernible relationship between arsenate reduction and nitrate reduction.

Arsenite-resistant bacteria are infrequent in soil, but fairly common in faeces. About 10 per cent. of the bacterial count of fresh stable manure were found moderately tolerant and about 1 per cent. highly tolerant. In dipping-tanks an automatic enriching of resistant faecal bacteria, and suppression (or metamorphosis ?) of sensitive forms takes place.

Bedford (G. A. H.). **Anoplura from South African Hosts. Part II.**—*—Union of S. Africa Dept. Agric., 7th and 8th Repts. Direct. Vet. Res., April 1918, Cape Town,* 1920, pp. 709–734, 7 plates.

Part I of this paper has been already noticed [*R.A.E.*, B, viii, 9]. A further new species is *Linognathoides faurei* from a ground squirrel (*Geosciurus capensis*). Notes are also given on the sub-order Mallophaga, of which a number of new species are described.

Wilkins (S. D.) & Dutcher (R. A.). **Limberneck in Poultry.**—*Jl. Amer. Vet. Med. Assoc., Washington, D.C.,* lvii, N.S. x, no. 6, September 1920, pp. 653–685, 9 figs.

The only positive results attained in various attempts to produce limberneck in chickens came from feeding them on larvae of *Lucilia caesar* that had fed upon the dead bodies of infected chickens or on those of paralysed pigs.

The experiments also indicated that symptoms of limberneck are not comparable with those of polyneuritis (avian beri-beri) brought about by dietary deficiencies, nor to the symptoms of *Bacillus botulinus* poisoning in chickens. It was, moreover, not possible to produce limberneck symptoms in poultry by feeding with and injecting the toxins produced by three different strains of *Bacillus botulinus.* The strains were, however, toxic to guinea-pigs.

It was impossible to produce limberneck symptoms by feeding the chickens with common salt, paint skins (lead poisoning), smut or tainted meat.

Larvae of *Calliphora vomitoria, Musca domestica* and *Lucilia caesar* that developed from eggs laid upon fresh beef, were not toxic when eaten by chickens, nor were larvae of the first two species that had developed on limberneck carcases.

Adequate diets do not protect poultry from limberneck.

The body temperature of chickens falls below normal in *Bacillus botulinus* poisoning, and in polyneuritis, but this was not observed in limberneck.

Gallagher (B. A.). **Rose-Chafer Poisoning in Chickens.**—*Jl. Amer. Vet. Med. Assoc., Washington, D.C.,* lvii, N.S. x, no. 6, September 1920, pp. 692–695.

A part of the matter contained in this paper on the poisonous effect of *Macrodactylus subspinosus* when eaten by chickens, and on its life-history and control has already been noticed [*R.A.E.*, B, iv, 26]. The symptoms of poisoning may appear as early as one hour after feeding on the beetles. The affected bird becomes drowsy and falls over on its side, and the retraction of the head and neck over the back of the chicken is quite characteristic. Death occurs within 24 hours. The rapid action of the toxin renders treatment unsatisfactory in birds already showing symptoms. An effort, however, may be made to reduce the mortality by administering a purgative to the whole flock as soon as the nature of the trouble is realised. Teaspoonful doses of castor-oil containing 15 drops of turpentine would be indicated, and may also be given to birds showing symptoms. In a large flock, however, this takes too long, and Epsom salts are recommended in the proportion of a teaspoonful to each four birds under 10 weeks old, the total amount being dissolved in water and mixed in the amount of mash the flock will readily consume.

Besides preventive measures previously noticed [*loc. cit.*], the rose-chafer while in the pupal stage may be readily destroyed by ploughing and harrowing infested soil during May in the southern range of the beetle, and during the latter part of May and early June in its northern range.

HOFFMAN (F. L.). **The Malaria Problem in Peace and War.**—*Prudential Press, Newark, N.J.*, 1918, 101 pp. [Received 24th September 1920.]

This is a consolidation of papers read at the Annual Meeting of the National Committee on Malaria, Memphis, Tenn., 12th November 1917, and the Annual Convention of the New Jersey Mosquito Eradication Commission, Atlantic City, N.J., 31st January 1918, revised and enlarged. It is in two parts, the first dealing with the methods of eradicating malaria and their results at the present time, in the United States in particular, and also in other parts of America and in India, chiefly from the aspect of the work that is and may be done by public authorities. The second deals with malaria in relation to war, its history in the American Civil War, and the various aspects of its occurrence in the different theatres of the European War. The military problems of malaria control are considered, and modern conclusions based on war experiences are given.

KEMNITZ (—). **Untersuchungen über Stoffbestand und Stoffwechsel der Larven von** *Gastrophilus equi.* [Observations on the Composition and Metabolism of Larvae of *Gastrophilus equi.*]—*Verhandlungen der Deutschen Zool. Ges., Berlin*, no. 24, 1914, pp. 294–307, 2 figs.

A series of experiments here described show that the red colouring matter found in the tracheal cells of *Gastrophilus* larvae is identical in character with the haemoglobin of vertebrate animals, at least as far as regards the iron content. The relative proportions of glycogen, chitin and fat contained in the larva are described. Artificial feeding experiments were also made to ascertain the essentials required for life during the larval period. Apparently the larvae can only thrive on an acid medium showing at least a 0·4 per cent. acid reaction. After a few days, owing to the metabolism of the larvae, the acid becomes neutralised. In the case of substances containing albumen the acid is neutralised by the formation of ammonia. The probable functions of the various component parts of [the larval contents mentioned above are discussed.

Young (A. R.). **Report of the Divisional Director.**—*New Zealand Dept. Agric. Indust. & Commerce, Ann. Rept. 1918–19, Wellington,* 1919, pp. 10–15. [Received 27th Sept. 1920].

As a result of a conference held in Auckland to deal with the problem of the tick, *Haemaphysalis bispinosa*, it was found that the original suggestion regarding a quarantine area would be likely to be impracticable, and it was therefore abandoned. It has been decided to deal with this pest by strict control measures, and any area in which the tick is found is to be placed at once under comprehensive regulations, which are to be drawn up for this purpose. So far no compulsory action has been taken with regard to the eradication of the pest, but information on the subject of its control is being disseminated in the affected districts, and dipping tanks subsidised by the Government are being erected.

**The Blow-fly Pest.**—*Science and Industry, Melbourne,* ii, no. 7, July 1920, pp. 428–430.

The investigations that are desirable on the subject of the blow-fly pest in Australia are outlined. There are four distinct headings: measures against the adult fly; against the larva or pupa; measures to protect sheep from attack; and those designed to destroy maggots already present. Emphasis is laid on the importance of natural enemies [*R.A.E.*, B, viii, 174]; a large amount of work remains to be done to determine the various species of flies that frequent sheep, especially those that breed in wool, etc.; to find whether any particular species initiate the conditions; to determine the distribution of the various species and their local prevalence; and to make careful tests of the best traps and baits. Experiments with regard to dips and sprays suitable to various circumstances are also to be continued.

An investigation of the acute affection of sheep sometimes associated with fly infestation is also important.

Lamborn (W. A.). **Some further Notes on the Tsetse-flies of Nyasaland.**—*Bull. Entom. Res., London,* xi, no. 2, September 1920, pp. 101–104.

The author records a hurried visit in July 1919 to a village near the Livingstonia Peninsula on Lake Nyasa, where in 1914–15 some work was carried out on the various insects parasitic on the puparia of *Glossina morsitans*. Great success was obtained at that time, particularly with *Mutilla glossinae*, Turner, judging from the number of parasitic cocoons found in old puparia of the fly and bred from recent ones. In 1919 *G. morsitans* was present in abundance, indicating perhaps the failure of the natural parasites to keep pace with the migrations of the fly. *G. brevipalpis* was frequently found in the same area with *G. morsitans*, although the breeding-places selected were very different.

It is known that the parasites of puparia of tsetse flies are fairly numerous and that in some areas they exert a considerable influence in reducing their numbers. While various explanations have been given for remarkable diminution in the numbers of *Glossina* in certain districts without there being any marked diminution in the numbers of game animals therein, the author suggests that the local extermination of the flies may be due to the activities of their parasites. This process seems to be steadily proceeding in the district indicated, and the question naturally arises how far it may be possible to increase the influence of parasites, either by the introduction of new ones or by breeding on a larger scale those already known to science.

As the genus *Glossina* is now limited to the Ethiopian region, it is doubtful how far the parasites of other Diptera, brought in from other lands, would seek out and destroy its puparia. It seems likely that those obtained from the puparia of other Muscids, breeding under more or less similar conditions, might do so, or other species naturally parasitic on *Glossina*, but having a different geographical distribution, might give greater success. For example, the Bombyliid, *Villa lloydi*, Aust., parasitic on *G. morsitans*, has as yet only been found in Rhodesia, and a second species of parasitic Mutillid, *M. benefactrix*, Turner, only in Nyasaland. The parasites that occur on the west coast of Africa are probably different from those in the east and south, the insect fauna as a whole being different. It is thought, therefore, that the various species of tsetse-flies may each have different parasites, which have not yet been discovered, and which might be interchangeable. It is probable that some of the parasites of tsetse-flies, with less powers of flight than their hosts, have been left behind in the first foci inhabited by the flies ; this is particularly likely with Mutillids, the females of which are wingless. The advisability of enhancing the value of the parasites already known to science, in particular the Chalcids, is pointed out. These could readily be bred in the laboratory on the puparia of their natural host, or, as these are rather limited, on those of some of the common Muscids as alternative hosts. Some research has been done in regard to suitable alternative hosts, and though the work has been brought to a premature close, the results show some promise and will be published later.

BORNAND (M.). **L'Hypoderme du Boeuf et ses Conséquences au Point de Vue économique.**—*Procès-Verb. Bull. Soc. Vaud. Sci. Nat., Lausanne*, liii, no. 198, 15th Sept. 1920, pp. 55–58.

Almost 80 per cent. of the cattle of the Jura and the Alps are infested with the larvae of *Hypoderma bovis*. The author has never met with the larvae on cattle that remain in the plains during the summer months. It is particularly the young animals that are attacked, and the numbers of larvae found on one of these may be as many as 500. The financial loss caused by this fly in Denmark, Switzerland and Germany is enormous, since hides badly riddled by the larva lose half their value.

LUDLOW (C. S.). **Siberian** *Anopheles*.—*Psyche, Boston, Mass.*, xxvii, no. 4, August 1920, pp. 74–78.

The new mosquitos here described from Siberia are *Anopheles lewisi* and *A. selengensis*.

EDWARDS (F. W.). **Notes on the Mosquitos of Madagascar, Mauritius and Réunion.**—*Bull. Entom. Res., London,* xi, no. 2, September 1920, pp. 133–138.

The examination of a considerable number of mosquitos from Madagascar and the neighbouring French islands has disclosed the existence of several species hitherto unrecorded from these regions, as well as some new data concerning their synonymy. The 28 species of mosquitos hitherto known from the islands are dealt with, and descriptions are given of two new species, *Culex ventrilloni* and *Uranotaenia neireti,* both taken at Tananarive, Madagascar.

AUSTEN (E. E.). **Notes on the Nomenclature of certain African Tabanidae (Sub-family Pangoniinae), with Descriptions of a new Genus and new Species.**—*Bull. Entom. Res., London,* xi, no. 2, September 1920, pp. 139–152.

It was pointed out by Brèthes in 1914, that the generic designation *Diatomineura,* Rond., is a synonym of *Osca,* Wlk. *Erephopsis lata,* Guér., which was designated by Brèthes as the genotype, will become *O. lata,* Guér., and the South African *Pangonia barbata,* L., and *P. fulvifascia,* Wlk., will also be transferred to this genus. The species at present grouped under *Diatomineura,* sub-genus *Corizoneura,* cannot be referred to *Osca,* and therefore *Corizoneura* is raised to generic rank.

A new genus, *Buplex,* is erected and described for certain Ethiopian and Oriental species included under the *Corizoneura* section of *Diatomineura,* but not congeneric with *C. aethiopica,* Thunb.

A key is given to these genera, and descriptions are included of the new species, *Buplex fuscinervis* and *Corizoneura formosa,* from the Cape, *C. schwetzi* from the Belgian Congo, *Pangonia discors* from Angola, *P. lautissima* and *P. carpenteri* from Tanganyika Territory, and *Thriambeutes fuscus* from Bechuanaland.

REICHENOW (E.). **Los Hemococcidios de los Lacertidos.** [The Haemococcidia of Lizards.]—*Trab. Mus. Nac. Ciencias Nat., Madrid,* Ser. Zool. no. 40, 1920, 153 pp., 8 plates, 17 figs.

A study has been made of a blood parasite, *Karyolysus lacertae,* occurring in a lizard, *Lacerta muralis.* This parasite is transmitted by a Gamasid mite, *Liponyssus saurarum,* Oudms., which is commonly found on lizards in Madrid. The life-cycle of this mite is described. The meal of blood is generally taken at night, when the lizard is asleep. From 24 to 36 hours later the first eggs are laid in a protected spot, and in all, three or four blood-meals may be taken at a few days' interval, oviposition following each time until 50 or 60 eggs have been laid, when the female dies. Five days after oviposition the eggs hatch, so that, at a temperature between 76° and 86° F., development of the mites is very rapid. The development of *K. lacertae* in the mites, and the infection of the lizard by means of the digestive tube are described. The presence of the parasite seems to be in no way noxious to the life or development of the lizard host.

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Macfie (J. W. S.) & Ingram (A.). **The Early Stages of West African Mosquitos. v.** *Culex decens*, **Theo., and** *Culex invidiosus*, **Theo.**—*Bull. Entom. Res., London*, xi, no. 2, September 1920, pp. 105–112, 2 figs.

In view of the diversity of opinion as to whether *Culex decens* and *C. invidiosus*, both of which are widely distributed in British West Africa, should be regarded as two distinct species or merely as two forms of one species, the authors of the present paper have examined a number of larvae and pupae of these mosquitos, and their characteristic features are described and compared. Neither stage provides any feature of differential importance, and it is therefore considered that they should be regarded as varieties and not as distinct species. It is proposed to retain the name *C. decens* for the species.

Jack (R. W.). **Some Notes and Remarks on the Bionomics of** *Glossina morsitans*.—*Bull. Entom. Res., London*, xi, no. 2, September 1920, pp. 113–132.

These observations on *Glossina morsitans* are of necessity of a somewhat scattered and meagre nature, having been made during brief visits to the fly-areas in Southern Rhodesia. It is hoped, however, that the tentative views put forward may arouse interest among other investigators and perhaps receive either confirmation or criticism supported by actual observations. Lamborn, recording observations in Nyasaland in 1915 [*R.A.E.*, B, iv, 113], contends that the breeding season of *G. morsitans* is at its minimum in July, and is at its height in October, when the first rains may be expected. The author has previously remarked upon the marked difference in the distribution of tsetse-fly in the dry and wet seasons. The type of haunt where the fly is most numerous in the dry season consists of isolated areas of low-lying grass land with some evergreen trees along at least some portion of its margin; here the grass-feeding animals concentrate in large numbers and provide an ample food-supply; such centres might be regarded as first grade foci. In other favourable fly-areas, rivers and vleis may be much more prevalent, and intense concentration of game and fly does not occur; such areas might be termed second grade foci; while shady forests beside rivers where game is likely to rest during the day or pass through for drinking purposes, and where the bushbuck frequently makes its home, might be termed third grade foci. As all kinds of animals seek shade during the heat of day in hot weather, and as the fly also is dependent upon shade, fly and game will tend to meet most frequently at the time of year when shade is restricted. Provided, therefore, that the temperature is suitable for breeding, the dry season should in general be more favourable to the fly. The dependence of the fly on large mammals for its food supply, which is a theory accepted by most investigators, is assumed throughout this paper. During the earlier part of the dry season, in May, June and July, the coldest weather occurs, and there is little doubt that the fly breeds less freely and that the pupal period is more prolonged, so that the fly tends to be less numerous at that time of year; from August onward to the rainy season considerable increase occurs; with the advent of heavy and persistent rains the

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fly scatters and therefore appears to decrease suddenly. The later, therefore, that the rains are in coming, the greater is the insect's capacity for increase. It follows that seasons of unusually heavy rainfall are on the whole inimical, while a series of years of low rainfall is favourable to the fly.

Many investigators have laid emphasis on the efficacy of grass fires in reducing the fly. The author has been unable to obtain the slightest evidence in support of this theory, in fact the evidence to the contrary appears almost conclusive. If the tsetse-fly could not avoid grass fires, it would seem impossible that the species could avoid extermination in parts of the country inhabited by natives. The mopani belts, where the grass remains short, are probably a convenient refuge from grass fires in the dry season, and are also attractive to game in the wet season.

The author is extremely sceptical concerning the fly's alleged habit of migrating with game. During ten years' investigations he has found no tendency on the part of the fly to migrate under the stimulus of hunger or in company with game. There is, however, always the seasonal scattering during the wet season, and sometimes forced movements induced by destruction of the forest ; in the latter case the fly naturally follows the receding shade.

There has been a fairly generally accepted idea that *G. morsitans* locates game and follows its movements more or less continuously, at least within the limits of infested country. The author attempts to show that this is not its general habit. Indications against the theory are that female flies are apparently not known to follow to any great distance at any time ; that gravid females seek seclusion and are not likely to attempt to follow a moving herd ; that hungry flies tend to feed fully and then abandon their hosts, which are unlikely to remain in the vicinity until the flies recover ; and that the fly is diurnal in habit, while game moves largely at night. It would seem, therefore, that the only individuals capable of following game, even for a few hours, are those that do not desire to feed. The probability is that the fly neither ranges the forest in search of its host, nor follows it when encountered for any length of time, but that it lies in ambush waiting for the animal to come within the range of its perceptive powers. The maximum distance at which a hungry fly readily detects its hosts is a short one, possibly less than 100 yards, and following on the part of females has only been proved up to about 400 yards. The situation in regard to certain fly-infested vleis during 1919 is discussed at some length. The maximum following distance of females remains to be determined ; the author is not yet convinced that the females seek animals and human beings only for the purpose of feeding, though this appears probable.

PAYOT (F.). **Contribution à l'Etude du *Phthirus pubis* (Linné, Leach). Morpion, Schamlaus, Filzlaus, Piattola, Crab-louse.**—*Bull. Soc. Vaud. Sci. Nat., Lausanne*, liii, no. 198, 15th September 1920, pp. 127–161.

The distribution, morphology and biology of *Phthirus pubis* and the action of various substances on this louse are discussed in detail. The life-cycle, which is compared with that of *Pediculus humanus* since the two are often confused, lasts from 22 to 27 days. It can live temporarily on rabbits, guinea-pigs, rats and dogs. Separated from man, *P. pubis* soon dies, and it is quickly overcome by lack of moisture and by heat, but it can live for 48 hours under water. In treatment, mercurial substances are dangerous, fatty substances containing xylol, benzine, etc., being preferable.

FEYTAUD (J.) & GENDRE (E.). **Sur la Répartition des Gîtes d'*Anopheles maculipennis* et d'*An. bifurcatus*.**—*Procès-Verb. Soc. Lin., Bordeaux,* lxxi, 1919 (25th August 1920), pp. 24–25.

*Anopheles maculipennis* breeds chiefly in stagnant, fairly clean and sunny water, with more or less abundant vegetation and a high temperature (20°–25° C.), while *A. bifurcatus* prefers pure, cold (12°–15° C.), running, or often renewed water.

FEYTAUD (J.) & GENDRE (E.). **Sur la Résistance des Larves d'Anophèles dans les Eaux picriquées.**—*Procès-Verb. Soc. Lin., Bordeaux,* lxxi, 1919 (25th August 1920), p. 25.

Experiments made to test the powers of resistance of *Anopheles maculipennis* and *A. bifurcatus* to picric acid in water showed that half-grown larvae lived for a quarter of an hour in a solution of $\frac{1}{2}$, 5 hours in a solution of $\frac{1}{25}$, 4–5 days in $\frac{1}{100}$, a week in $\frac{1}{400}$ and in a solution of $\frac{1}{600}$ were able to transform to nymphs and adults.

RUPPERT (F.) & HUBER (F.). **Ueber die tierärztliche Tätigkeit im Feldzuge in Deutsch-Ost-Afrika.** [The Veterinary Service in the Campaign in German East Africa.]—*Deutsche Tierärztl. Wochenschr., Hannover,* xxviii, nos. 38, 39, 18th, 25th September 1920, pp. 441–446, 455–458, 10 figs., 1 map.

The methodical use of strongly trypanocidal agents proved an excellent means of combating tsetse infection. It has been thought that the flies bite by day only, but numerous observations showed that biting by night occurred with all the species met with, *viz.*, *Glossina palpalis*, *G. morsitans*, *G. fusca*, *G. tachinoides** and *G. pallidipes*.

There were very few fatal cases of piroplasmosis among equines; the infection was due to *Nuttallia*. No infection was observed in cattle, nearly all the latter being immune in East Africa.

African coast fever caused little loss. The infected zones were known, and by using a 15-day dip containing arsenic 1 part by weight and water 100, and placing the animals in an enclosed pasture that was twice changed (as prescribed by Theiler) not a single animal was lost.

VAN SACEGHEM (R.). **Contribution à l'Etude de la Transmission du *Trypanosoma cazalboui*.**—*Ann. Med. Vet., Bruxelles,* lxv, no. 8–9, August & September 1920, pp. 369–374.

*Trypanosoma cazalboui* var. *pigritia* is probably transmitted by biting flies other than *Glossina* and also by mosquitos and even ticks. In the Zambi district the chief vector is apparently *Haematopota*

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[*It is probable that this is a misidentification for *G. austeni*.—ED.]

*perturbans*, Edw., tsetse-flies being completely absent in this part of the lower Congo. Fresh cases of infection always appeared between the months of November and May, the dangerous period thus coinciding with the rainy season. Certain herds were apparently immune to infection, possibly owing to the absence of *H. perturbans* from their vicinity.

BODET (—). **Notes sur quelques Cas de Pseudo-Myase rampante ou Oerbiss, ou Pseudo-Draconculose observés à Tamatave.** [Notes on some Cases of creeping Pseudo-Myiasis or Oerbiss or Pseudo-Draconculosis observed at Tamatave.]—*Ann. Med. & Pharm. Colon., Paris,* 1920, Special no., pp. 50–56.

Further cases of this disease are described from Madagascar. Although it is probably of parasitic origin [*R.A.E.*, B, vii, 28], the causal agent has not yet been determined.

LAMOUREUX (—). **Moustiquaire de Campagne pour Homme couché.** [Field Mosquito Net for Sleeping.]—*Ann. Med. & Pharm. Colon., Paris,* 1920, Special no., pp. 89–91.

The mosquito net here described is easily adapted to all circumstances of a soldier's life, and may be carried in his equipment. The total weight varies from about 19 to 21 ounces.

STEMPELL (W.). **Ueber den Erreger des Fleckfiebers.** [The Causal Agent of Typhus.]—*Sitzungsber. Naturh. Ver. d. preuss. Rheinlande u. Westfalens, 1919 (1917–1919)*; *Bonn,* 1920, B, pp. 3–7, 22nd October 1919.

In the abstract under the above title recently published [*R.A.E.*, B, viii, 202], " recurrent fever " read " typhus "throughout.

GOETGHEBUER (M.). **Métamorphoses et Moeurs du** *Culicoides pulicaris*, **Linné.** [Metamorphoses and Habits of *Culicoides pulicaris*, L.]—Separate from *Ann. Soc. Entom. Belgique, Brussels,* lix, 1919, 6 pp., 7 figs.

*Culicoides pulicaris*, L., is very abundant in Belgium, especially in damp and marshy regions. It has not yet been ascertained in what stage the winter is passed. There are several generations a year. The larvae are found in the stagnant water of ditches and pools, but the duration of this stage is unknown. The pupal period lasts 2 or 3 days, and the adults are capable of flight immediately after emergence. The males do not bite, but the females attack man and other animals. During rainy or comparatively cold weather the adults hide in the cracks of tree bark. Oiling of the pools for the destruction of the pupae is suggested as a remedial measure. *Culicoides pumilus*, Winn., *C. varius*, Winn., and *C. fascipennis*, Winn., are also recorded as occasionally attacking man.

GOETGHEBUER (M.). **Ceratopogoninae de Belgique.** [Ceratopogoninae of Belgium.]—*Mém. Mus. R. d'Hist. Nat. de Belgique*, viii, no. 3, September 1920, pp. 1–116, 126 figs.

The habits and structure of the larvae and pupae are briefly reviewed, and the morphology of the adults described in considerable detail. Tables for the identification of the Belgian genera and species are given, most of them being also fully described and illustrated. Eighty-seven species are dealt with in all, twenty-two of these being regarded as new.

The following Belgian species of *Culicoides* are recognised: *C. amoenus*, Winn., *C. varius*, Winn., *C. fascipennis*, Winn., *C. arcuatus*, Winn., *C. pictipennis*, Winn., *C. pulicaris*, L., *C. impunctatus*, sp. n., *C. punctaticollis*, nom. n. (*puncticollis*, Goet., nec Becker), *C. unimaculatus*, nom. n. (*kiefferi*, Goet., nec Patton & Cragg), *C. albicans* Winn., and *C. pumilus*, Winn.

KIEFFER (J. J.). **Chironomides d'Europe conservés au Musée National Hongrois de Budapest.** [European Chironomidae in the Collection of the Hungarian National Museum at Budapest.]—*Ann. Mus. Nat. Hung., Budapest*, xvii, 1919, pp. 1–160.

This paper is mainly devoted to a revision of the European CERATOPOGONINAE, tables being given for the determination of almost all the described species. [A table for determining the genera has been published by the author in the same journal, vol. vi, pp. 292–296, and is not repeated here.] Numerous figures of the details of antennal structure are given. In the genus *Culicoides*, 44 species are tabulated, the following being described as new:—*C. latipennis*, *C. nanulus*, *C. cinerellus*, *C. subfasciipennis*, *C. guttularis*, *C. pallidicornis*, and *C. lacteinervis* from Hungary, *C. belgicus* from Belgium, and *C. susae* from Italy.

MARTINI (E.). ***Anopheles* in der näheren und weiteren Umgebung von Hamburg und ihre voraussichtliche Bedeutung für die Volksgesundheit.** [*Anopheles* in the more or less immediate Neighbourhood of Hamburg, and their presumable Importance in National Health.]—*Abh. aus dem Gebiete der Naturwiss., Hamburg*, xxi, no. 2, 1920, pp. 1–32, 2 maps, 2 charts.

In view of the return to Germany of many malaria carriers from the armies, the need for ascertaining the distribution and frequency of Anophelines became evident, in order to establish sanatoria in mosquito-free localities and to discover the districts where malaria might again become epidemic as in early times. In August 1918, the German Ministry for the Interior invited the co-operation of the various German States, and the Senate of the Hamburg Republic requested the Hamburg Institute for Tropical Diseases to undertake the work in its territory. The author records his investigations in the present paper. They chiefly deal with *A. maculipennis*. *A. bifurcatus*, which is less common and is difficult to observe, and *A. plumbeus* (*nigripes*) were only studied in an incomplete manner.

In general *A. maculipennis* prefers clear water for breeding, and requires sunny situations. The presence of the larvae of this species not only depends on the water and on the vegetation, but also on the presence of cattle, and this last fact may explain the changing location of the breeding-places in the course of the summer. A map of the distribution of *A. maculipennis* around Hamburg is given.

The author does not consider it proved that *A. bifurcatus* comes indoors less readily than *A. maculipennis*. All its breeding-places were in either half or full shadow. As this species hibernates in the larval stage, it is obviously necessary that the water should not become entirely frozen, and this involves the necessity for a certain degree of inflow from the bottom.

*A. plumbeus* (*nigripes*) occurs near woods where there are tree-holes that serve its larvae as breeding-places. It does not appear to come indoors, and is of little importance as regards malaria.

Most of the localities in which malaria was endemic in the eighties and nineties of the last century may be regarded as still inconspicuously malarious, and careful examination of the children in them would reveal a number of carriers. The reasons why the disease has decreased in Germany are the cheapening and availability of quinine, the changes leading to a gradual elimination of mosquito breeding-places, and changes in the habits of the population, which have made transmission more difficult. The author is convinced that a sinking of the level of subsoil water must lead to a reduction in the number of mosquitos. The peasants now live in modern houses where mosquitos are not able to enter with the same ease as previously, where the bed-rooms are more distinctly separated, and where the indoor temperature is not so high, so that the parasites can only develop during a limited part of the year.

To reduce the malarial incidence still further, breeding-places must be eliminated; in marshlands where this is not possible, screening must be resorted to.

MARTINI (E.). **Ueber mecklenburgische Culicinen.** [Mecklenburg Culicines.]—*Sitzungsber. u. Abh. naturf. Ges. zu Rostock,* N.S. vii, 1920, pp. 203–208, 1 plate.

The two new species, *Aëdes* (*Ochlerotatus*) *rostochiensis* and *A.* (*O.*) *semicantans*, previously recorded from Mecklenburg [*R.A.E.*, B, viii, 171] are described and figured. The larva of the former was found in ditches or water-holes at the edge of woods; that of the latter in turf-cuttings at the bottom of which there was peat-moss.

The author has observed the following mosquitos in Mecklenburg: *Anopheles maculipennis*, *A. plumbeus* (*nigripes*), *A. bifurcatus*, *Aëdes nemorosus*, *A. sylvae*, *A. terrieï*, *A. rostochiensis*, *A. salinus*, *A. diversus*, *A. ornatus*, *A. cantans*, *A. annulipes*, *A. abfitchi*, *A. semicantans*, *A. vexans*, *A. dorsalis*, *A. cinereus*, *Theobaldia annulata*, *T. morsitans*, *Culex pipiens*, and *Taeniorhynchus richiardii*.

Among the German mosquitos not yet recorded from Mecklenburg are *Aëdes quartus* and *Culex territans*, but the nature of the country makes it probable that they do occur there.

Friederichs (K.). **Zur Kenntnis der deutschen Simuliiden, Vorläufige Mitteilung.** [A preliminary Communication on German Simuliids.]—*Sitzungsber. u. Abh. naturf. Ges. zu Rostock*, N.S. vii, 1920, pp. 211–226.

In view of the losses caused by Simuliids to cattle in Central and North Germany, the author has prepared a work on the 10 German species, but as its publication is likely to be delayed, this preliminary notice is issued.

As a result of his perusal of Edwards' paper on British Simuliids [*R.A.E.*, B, iii, 140] the names used by the author in his previous paper [*R.A.E.*, B, viii, 134] have been radically altered. The species there recorded as *Simulium maculatum* is now described as *S. costatum*, sp. n., and for *S. angustitarse*, Lundstr., it is necessary to substitute *S. aureum*, Fries.

A key and explanatory notes are given to *S. ornatum*, Meig., *S. reptans*, L., *S. monticola*, sp. n., *S. venefica*, sp. n., *S. argyreatum*, Meig., *S. pictum* Meig., *S. auricoma*, Meig., *S. costatum*, sp. n., *S. latipes*, Meig., *S. aureum*, Fries, *S. angustipes*, Edw., *S. maculatum*, Meig., and *S. hirtipes*, Fries.

Foot K.). **Preliminary Note on the Spermatogenesis of *Pediculus vestimenti*. Determination of the Sex of the Offspring from a single Pair of *Pediculus vestimenti*.**—*Biol. Bull. Marine Biol. Lab., Woods Hole, Mass., Lancaster, Pa.*, xxxvii, no. 6, December 1919, pp. 371–384 & 385–387, 2 plates.

The contents of these papers on *Pediculus humanus* (*vestimenti*) are indicated by their titles.

Arrow (G. J.). **A peculiar new Genus of Australian Beetles.**—*Ann. Mag. Nat. Hist., London*, vi, no. 34, 1920, pp. 434–437.

*Macropocopris*, gen. nov., is proposed for certain coprophagous beetles found attached to the fur of wallabies. The species belonging to this genus are tabulated, and *M. prehensilis*, sp. n., and *M. symbioticus*, sp. n., are described from Queensland.

Speyer (E. R.). **Notes on Chemotropism in the House-Fly.**—*Ann. App. Biol., Cambridge*, vii, no. 1, September 1920, pp. 124–140.

The first series of the experiments here described was made with various common food-stuffs, with the result that banana was found to be the most attractive to house-flies; it became increasingly attractive during fermentation, but the attractive power passed off as the putrescent mass dried. Experiments were then undertaken with the decomposition products of banana and substances allied to them. Carbohydrates in an unfermenting condition were very little attractive. Valerianic acid, amyl acetate and amyl alcohol were attractive in that order; they were more attractive than unripe banana, but less so than decomposed banana.

Further experiments were made with alcohols, aldehydes and acids, and the following conclusions were drawn. Saturated alcohols, aldehydes and acids are positively chemotropic in products of fermentation, so far as amyl compounds are concerned. Alcohols, aldehydes and acids containing the methyl group $CH_3$ are positively chemotropic, except in cases where their molecular weight is about 30 (methyl alcohol) or below, the chemotropic stimulus being aggravated where the methyl group is augmented by union with $(CH_2)_x$. Compounds containing the benzene ring are unattractive, though not necessarily negative (repellent). These are unsaturated. Amyl compounds are probably increasingly attractive in the order in which they are formed during fermentation and decomposition. It is possible that the aldehyde group, in all compounds containing it, is to a certain extent negatively chemotropic. There is no relation between volatility and chemotropic action.

It may be pointed out that saturated compounds contained in fermenting vegetable substances and containing the molecular group $CH_3 (CH_2)_x$, may constitute the source by which the house-fly is guided to its food.

Experiments with essential oils indicated that in general they are unattractive, certain of them being inactive, while others evoke negatively chemotropic stimuli. During evaporation the repellent action passes off.

A record of other insects observed during the experiments showed that the stimuli are not the same for all insects.

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França (C.). **La Flagellose des Euphorbes.** [Flagellosis of *Euphorbia.*] —*Ann. Inst. Pasteur, Paris,* xxxiv, no. 7, July 1920, pp. 432–465, 2 plates. [Received 4th October 1920.]

The morphology and development of a flagellate, *Leptomonas davidi*, in the latex of *Euphorbia* are discussed. In Portugal the transmitting agent is *Stenocephalus agilis*, Scop. [*R.A.E.*, B, viii, 17].

This Coreid bug was discovered with some difficulty, as it hides under dry leaves during the day and only goes to *Euphorbia* at night. It is most abundant in July and August; mating takes place in those months, when the females, which predominate, nearly all have mature eggs. Oviposition does not seem to occur on *Euphorbia*. The young forms appear in August. *Stenocephalus* appears to be exclusively phytophagous. In Portugal it feeds on the latex of *Euphorbia peplus* and *E. segetalis* and has not been noticed on any other plants. After sucking in one place the bug begins at another, this fact explaining the numerous punctures.

The evolution of the flagellate in the insect is also dealt with. The Leptomonads multiply by division. From the fourth day of infection they increase in size, and giant forms occur, such as are not seen in the latex. Between the fourth and eighth days very minute forms, quite different from those previously seen, appear. These parasites occur throughout the digestive apparatus, and later invade the salivary glands. They are evidently the infective forms. It would appear that the developmental cycle of *L. davidi* is confined to the bug and the plant, and that transmission from one bug to another must be rare. *S. agilis* is not only a vector, it is the animal and primitive host of *L. davidi*.

Mesnil (F.) & Roubaud (E.). **Essais d'Inoculation du Paludisme au Chimpanzé.**—*Ann. Inst. Pasteur, Paris*, xxxiv, no. 7, July 1920, pp. 466–480, 1 plate. [Received 4th October 1920.]

The existence of mammals, other than man, capable of harbouring the virus of human malaria under natural conditions has not yet been determined.

Chimpanzees have been inoculated experimentally with *Plasmodium vivax*, but although these apes may be slightly susceptible to the disease, their rôle as natural carriers still remains to be proved.

Wilhelmi (I.). **Zur Klimatheorie des Problems der Kriebelmückenplage.** [The Climate Theory in Connection with the *Simulium* Pest.]—*Deutsche Tierärztl. Wochenschr., Hanover*, xxviii, no. 40, 2nd October 1920, pp. 470–471.

The author has suggested that outbreaks of *Simulium* are caused by the somewhat sharp change of temperature in spring in regions with a continental climate, or, in a certain degree, in regions with a transitional climate. The losses among cattle are indeed confined to such regions. Such losses are conspicuous by their absence in the British Isles, where Simuliids are abundant, but a sea climate obtains. The present article contains data gathered in Germany in 1920 that appear to support this view to some extent.

Stedefeder (—.). **Zur Frage der Viehverluste durch Kriebelmücken** (*Simulium reptans*). [Regarding the Losses among Cattle due to *S. reptans*.]—*Berliner Tierärztl. Wochenschr.*, 1920, p. 15. (Abstract in *Deutsche Tierärztl. Wochenschr., Hanover*, xxviii, no. 40, 2nd October 1920, p. 472.)

During very warm weather in September 1919 the author observed among cattle some cases that led to compulsory slaughtering. The symptoms were similar to those caused by *Simulium reptans* near Hanover. No insect was found.

From the aetiological standpoint it is important that the swollen lymphatics of the neck contained bi-polar bacteria ; it is considered possible that infection was conveyed by mosquito bites.

**Medical Entomology.**—*Nigeria* (*Southern Provinces*) ; *Ann. Med. & Sanit. Rept. 1918, Lagos*, 1920, pp. 95–97.

A list is given of biting flies from various stations, with notes on the breeding-places of the mosquitos found. One female of *Chrysops silacea* was found to be heavily infected with *Filaria*, 371 larvae in all being dissected from it. A species of *Triatoma* (*Conorhinus*), the bite of which resulted in acute lymphangitis, was also received.

*Stegomyia fasciata* is still the preponderating mosquito, though *Culiciomyia nebulosa* is also numerous ; others, in order of frequency, were *Anopheles costalis, Ochlerotatus irritans, Culex decens, Uranotaenia annulata*, and *Anopheles mauritianus*.

ALSTON (A. M.). **The Life History and Habits of two Parasites of Blowflies.**—*Proc. Zool. Soc., London,* 1920, part 3, September 1920, pp. 195–243, 20 figs.

This paper, which has an introduction by Prof. Maxwell Lefroy, deals with *Alysia manducator*, Panz., and *Nasonia brevicornis*, Ashm. The technique employed during the investigations is described, and a full account of the life-histories and habits of these parasites is given.

*Alysia manducator* is the more important parasite of blow-flies. The life-cycle of this Braconid varies from 33 days and upwards, with a mean average of 52 days. The eggs are deposited singly in the larva of the blow-fly. Hibernation occurs in the larval stage. This species has been successfully bred from *Lucilia sericata*, Meig., *L. caesar*, L., *Phormia azurea*, Fall. (*groenlandica*, Ztt.), *Calliphora erythrocephala*, Meig., and *C. vomitoria*, L.,

*Nasonia brevicornis*, Ashm., is primarily a parasite of the common house-fly, *Musca domestica*, but has also been bred from the species mentioned above. It may also accidentally become a secondary parasite of *A. manducator*, when the puparia containing the latter are within its limited reach. The length of life-cycle is entirely dependent upon the temperature, and ranges from 11 to 22½ days. Eggs are laid in the puparium of the host, and as many as 62 parasites have emerged from one host in captivity. Hibernation occurs in the larval stage within the host, and the adults emerge in the spring. The earliest record of emergence in England is the end of April.

ROBINSON (L. E.). **Malformations in Ticks.**—*Parasitology, Cambridge,* xii, no. 3, September 1920, pp. 175–179, 5 figs.

The abnormalities found in the ticks, *Dermacentor atrosignatus*, Neum., *Amblyomma hebraeum*, Koch, *A. cajennense*, F., and *Hyalomma aegyptium*, L., here recorded, are probably due to mutilation during the course of the preceding nymphal phase.

SWELLENGREBEL (N. H.) & SWELLENGREBEL DE GRAAF (J. M. H.). **A Malaria Survey in the Malay Archipelago.**—*Parasitology, Cambridge,* xii, no. 3, September 1920, pp. 180–198.

Previous work dealing with the distribution of Anophelines in the Malay Archipelago is reviewed. The bulk of the information regarding the larval habitats and the advisability of remedial measures has been noticed elsewhere [*R.A.E.*, B, viii, 53, etc.].

PEACOCK (A. D.). **The Anopheline Waters of Southern Flanders, being a Report on the Area occupied by the British Second Army in France.**—*Parasitology, Cambridge,* xii, no. 3, September 1920, pp. 234–252, 1 map, 1 fig.

A survey was carried out during the summers of 1915 and 1916 and during September 1918 to ascertain the Anopheline conditions in the area occupied by the British Army, and the probabilities of the spread of malaria among troops in Southern Flanders are considered. The technique employed during these investigations and the nature and character of Anopheline breeding places discovered are described. Anopheline larvae were found in almost all waters where the visible vegetation was grass or algae, the predominant species being *Anopheles maculipennis.* With the exception of the districts of Moulle and Arques the infestation appears to be very low in comparison with conditions in sub-tropical countries. A malaria epidemic is considered unlikely in this area. Owing to the nature and character of the infested waters, they are amenable to treatment by dragging of weeds and oiling, and the control of Anophelines should not be difficult.

WARBURTON (C.). **Sarcoptic Scabies in Man and Animals. A Critical Survey of our Present Knowledge regarding the Acari concerned.** —*Parasitology, Cambridge,* xii, no. 3, September 1920, pp. 265–300, 1 plate, 10 figs.

The object of this paper is to collate and present the work of previous authors in a compact form, and to indicate clearly the chief discrepancies involved. The urgent and immediate need for clearing up the confusion that exists with regard to the species and varieties of the genus *Sarcoptes* is emphasised. Detailed descriptions are given of *Sarcoptes scabiei* and of its various forms so far as they are known. It is suggested that one form should be completely studied so that differences of structure in others thought to be distinct from it may be clearly recognised. The form known as *equi* is suggested for this purpose, as it is easily obtainable and its salient characteristics are apparently more strongly marked than in the human form, details of the life-history of which in man are given.

METZ (C. W.). **On the Possibilities of using Mosquito Traps in Antimalaria Work.**—*U.S. Public Health Repts., Washington, D.C.,* xxxv, no. 34, 20th August 1920, pp. 1974–1977, 3 figs.

Draining, oiling and screening operations for the eradication of mosquitos are not practicable in many rural districts of the United States. During 1918 observations were made with a view to finding an effective trap or poison for use under such conditions. Unfortunately these investigations were not completed, but the results obtained point to the probable efficacy of such a method and the advisability of investigating the subject further. Small pig-styes, the construction of which is described and illustrated, proved the most effective trap that has as yet been tried.

It is evident that Anophelines react sufficiently to some stimuli to be enticed into traps, and under the conditions of this experiment, the traps—which were in the nature of small pens containing pigs—served to keep neighbouring buildings practically free from mosquitos. It is suggested that a careful study should be made of the sensory reactions of Anophelines, combined with chemical analyses and experiments with a view to discovering a substance that will prove sufficiently attractive to the mosquitos, and at the same time abolish the use of living animals in the traps.

Williamson (G.) & Oxspring (G. E.). **Demodectic Scabies in the Horse.**—*Vet. Jl., London*, lxxvi, no. 10, October 1920, pp. 376–379.

During an examination of about 220 horses in the Aldershot Command in July 1919, 40 showed signs of pruritis, which was attributed to *Demodex equi.* The symptoms and treatment of these cases are described. Skin dressing—with a non-irritant oil as a base and containing sulphur—proved most effective in slight infections, but when the disease had reached the pustular stage treatment proved more difficult and had to be very thoroughly carried out. All signs of the disease should have disappeared for a week or two before the animal can be considered cured.

Holmes (R. P.). **A Treatment of the Different Forms of Mange and other Parasitic Skin Diseases of Horses and Mules with a Combination of Calcium Sulphide and Horse Fat.**—*Vet. Jl., London*, lxxvi, no. 10, October 1920, pp. 380–385.

A combination of calcium sulphide and horse fat has proved to be an effective dressing in the treatment of sarcoptic, psoroptic, symbiotic and demodectic mange in horses. The method of preparing and applying the dressing is described. It is composed of 1 gal. calcium sulphide solution (made of 2¼ lb. sulphur and 1 lb. quicklime boiled together in water and made up to 2 gals.) 2 gals. water and 2 gals. horse fat, well mixed together and maintained at a temperature of 100° F. during the process of application.

This dressing has a marked effect on the eggs of lice and apparently destroys them by suffocation. It has a beneficial effect on the skin and tends to promote the growth of hair. It has also been used with success against forage mites and lice.

Wilhelmi (J.). **Die Kriebelmückenplage.** [Simuliid Pests.]—*Jena*, Gustav Fischer, 1920, 246 pp., 23 figs. Price 13 Marks.

This volume reviews the entire literature on Simuliids from the zoological and medical standpoints. About 400 references are given in the various chapters, some of which deal with the systematic position, nomenclature, morphology, anatomy and distribution of the adults. Others deal with the ecology and biology of the larvae and pupae, which are described.

The theories that have been advanced to account for sudden outbreaks of these flies are considered, and a report is given on the recommendations decided upon by the German Ministry of Agriculture and Forestry on 10th February 1920 together with the practical conclusions reached [*R.A.E.*, B, viii, 112] in view of the outbreak expected in spring.

Conciseness is a feature of this comprehensive work, the practical value of which is enhanced by separate indices to the literature, authors, and localities cited.

**Profilaxis del Tifus exantemático en Salta.**—*Anales Dept. Nac. Higiene, Buenos Aires*, xxvi, no. 2, March & April 1920, pp. 133–138. [Received 11th October 1920.]

In consequence of an epidemic of exanthematous typhus in the Provinces of Salta and Jujuy, where economic conditions and the total lack of hygiene encourage the spread of the disease, a delegation has been sent to those regions for the purpose of carrying out prophylactic measures. The organisation and equipment of the delegation are described.

Desoil (P.). **Observation d'Acariase Laelaptique accidentelle chez le Soldat par une Nymphe migratrice (*Iphis cubicularis*) du *Laelaps stabularis.*** [Observation of accidental Mite Infestation of a Soldier by a Migratory Nymph (*Iphis cubicularis*) of *Laelaps stabularis.*]—*C.R. Soc. Biol., Paris,* lxxxiii, no. 11, 20th March 1920, pp. 371–373.

A case is recorded of a French soldier on active service in 1918, whose cap lining was infested with minute Acarids almost invisible to the naked eye, causing slight pruritis at the lower edge of the scalp and on the neck. The mites were living on the organic residue accumulated in the folds of the cap lining, and their presence was evidently of some duration and a result of a biological adaptation to their surroundings. The mite proved to be a Gamasid possessing the characteristics of *Laelaps stabularis,* Koch, which is an interesting species on account of its polymorphism and the distinct biology of its various forms. Three forms of the nymphal stage have been described, viz., a protonymph, *Iphidulus vepallidus,* a deuteronymph, *Iphis foenalis* and a tritonymph, *Iphis cubicularis.* The form in question corresponded to *I. cubicularis,* of which the females are much more numerous than the males. It has been observed that while the first-named form lives on vegetable matter, the other forms have a tendency to migrate to small mammals, such as rats, to which they seek to attach themselves without becoming actually parasitic.

Sella (M.). **Relazione della Campagna antianofelica di Fiumicino (1919), con speciale Riguardo alla Biologia degli Anofeli ed agli Anofeli infetti.** [Report on Anti-anopheline Work at Fiumicino (1919), with special Reference to the Biology of Anophelines and to infected Anophelines.]—*Seconda Relazione della Lotta Antimalarica a Fiumicino* (*Roma*), pp. 81–314, 10 figs., 11 plates. [Supplement to *Ann. d'Igiene, Rome,* xxx, 1920.]

In the author's opinion petroleum is the best of the mosquito larvicides employed, though sodium cyanide may be capable of rendering useful service, especially if it again becomes available at its pre-war price.

Of the various methods adopted against the adults the best proved to be hydrocyanic acid gas and smoke, hand-collection, and window-traps. Hydrocyanic acid gas and smoke (the latter generated by smoke bombs) are suitable in stables, large rooms and sheds that are not too open; hydrocyanic acid is the very best fumigant where employable in practice. Hand-collection is well-suited to pig-styes and other small enclosures.

Besides *A. maculipennis* (*claviger*), *A. bifurcatus* is the only other somewhat common species at Fiumicino. Its life-cycle is in a certain degree complementary to that of *A. maculipennis*; it hibernates as a larva whereas the latter hibernates as an adult, and whilst the principal months for it are October-April, the latter appears from March to

October. The larvae of *A. bifurcatus* were found in drains, swamps and garden-wells, chiefly in the first two, and in isolated localities instead of in localities distributed over the district as was the case with *A. maculipennis.* Full details are given of the conditions under which *A. bifurcatus* occurs near Fiumicino. Owing to its comparative scarcity in the region around Rome, it is of no importance in the spread of malaria.

Eggs of *A. maculipennis* deposited on 8th February began to hatch in 14 days in a room and in 16 in a pig-stye where the water froze during a cold period, showing that freezing, in natural surroundings, does not interfere with development. During the early months of the year larval development requires about 2 months. At the end of May and in June this time may be reduced to 28 days, and in August to 16. Speaking generally oviposition begins in February. The author believes that there are 7 annual generations of *A. maculipennis* in this region. By generations he means the progeny resulting from the first consecutive ovipositions, as owing to the interval between the first and last ovipositions of a given female, her progeny at a given date may apparently belong to different generations. As the temperature falls at the end of the year the larvae become torpid. On 12th November, the air temperature being 10° C. (50° F.), a larva was observed to remain under water for 10 minutes. This never occurs in summer. At very low temperatures the larvae may remain under water for days; they cease to feed and to grow. The hibernation of *A. maculipennis,* as in general of all Anophelines, shows that hibernation depends on climate and must be regarded as an adaptation. The nymphal stage lasts about 7 days in April and May and 50 hours early in August.

According to the observations made, the influence of vegetation on the development of the larvae is not due to chemical action on the water, but solely to physical action. Speaking generally, vegetation may be divided into horizontal or superficial and into vertical or emerging. The former is favourable to *A. maculipennis*, while the latter is unfavourable to that species and more favourable to *A. bifurcatus.* The character of the ground around the marshes naturally re-acts on them, and therefore it is found that marshes with a horizontal vegetation are found in wood-less tracts, such as pasture or cultivated land, which represent a more domestic condition, whilst marshes with a vertical vegetation occur in bushy localities. In the latter type of marsh there is more shade and the water is colder than in the former type suited to *A. maculipennis.*

A full list of marsh and canal plants of the region is given. The following are those most favourable to *A. maculipennis*:—*Ranunculus aquatilis, Zannichellia palustris, Potamogeton pectinatus, Myriophyllum spicatum*, and *Ceratophyllum demersum.* Many of the marshes in the non-wooded zones become covered at the end of winter with a carpet of *Ranunculus.* Not only does this supply a support and food, but it divides the water into two strata, that at the surface being well-lit and warm and forming a perfect breeding place for the larvae of the hibernated adults of *A. maculipennis.* Deep water is not in itself unsuitable to the larvae, but only so to the extent that it prevents the growth of vegetation; when vegetation reaches the upper strata of the water, the temperature becomes largely independent of the depth. Thus larvae of *A. maculipennis* were found in places where the water was 7 feet deep but completely invaded by *Potamogeton pectinatus.* In the canals the deposition of eggs and the appearance of the larvae usually occur at a later date than in the marshes ; the water is colder and suitable vegetation is lacking at the end of winter and early in spring. In the hot months the contrary obtains ; the marshes diminish in importance and the canals become serious foci. They produce Anophelines up to the autumn, and the last winged specimens issue from them in November. *Spirogyra* and some other plants appear in some canals and form in July and August a covering that prevents access to the surface. It is for this reason that *Lemna* has been recommended against Anophelines, but too much must not be expected of this plant. It cannot thrive if oiling is carried out, and thus nothing impedes the development of the larvae until the plant completely covers the whole of the water ; indeed as long as the covering is scanty it favours the larvae.

Experiments with solutions of common salt showed that a degree of salinity greater than 9 per mille is not suited to the larvae of *A. maculipennis* or *A. bifurcatus*, though the pupae are able to stand stronger concentrations, such as 24·8 per mille. In the laboratory tests there was nothing to show that the adults could detect the salt dissolved in the water and regulate oviposition as a result. From the practical point of view it was worth ascertaining the time required by a concentrated solution to kill the larvae. It was found that a strength of 22 per mille caused death in 10 hours, and a strength of 18 per mille caused death in 24 hours. Unfortunately, such high strengths are not always feasible, and an initial high strength is gradually diluted by fresh water filtering in. In a further experiment it was found that such larvae as had not been killed by immersion in a salt solution survived after transfer to fresh water.

The adults of *A. maculipennis* begin to hibernate in mid-October. Reproduction usually ceases at this time, and food taken on several consecutive occasions may be used for forming adipose tissue instead of for developing the eggs.

From February to April the hibernated adults of *A. maculipennis* oviposit and die. Early in April the new adults appear. There is therefore no interruption in oviposition, and thus adult specimens of *A. maculipennis* occur throughout the year, which is not the case with *A. bifurcatus.* Whereas in winter there is no relation between feeding and egg-development, in summer the relation is very close, and the eggs are matured and laid after one meal. Anophelines do not bite again until they have digested the blood previously sucked. Generally speaking a given mosquito is unable to infect more than one person in the same night, its capacity for another feed being determined by the time required for digestion in the different months. Under experimental conditions Anophelines may feed while their eggs are in various stages of development. Under natural conditions in summer, *A. maculipennis,* having matured its eggs by one feed, does not feed again until the eggs have been deposited. It appears certain that both the winter and summer adults are able to oviposit several times. In natural surroundings the adults emerge both by day and night.

The relative humidity of the atmosphere is an important factor in the biology of *A. maculipennis*; in dry surroundings they rapidly die. In nature the females feed on blood only, though there are some exceedingly rare exceptions to this rule where fruit juices have been taken.

Experiments seem to show that *A. maculipennis* leaves occupied buildings only at dusk, and once this time is passed, it ceases to attempt to do so. At dusk it enters in large numbers, but isolated arrivals also occur during the night. By closing a building at dusk and then opening it there would be a possibility of imprisoning a number of individuals. It is owing to this need for food and shelter that *A. maculipennis* is essentially a domestic species.

Adults that were released for the purpose of determining the flight-distance were re-taken in large numbers at short distances up to $\frac{1}{4}$ mile; at distances of about 1 mile and $1\frac{1}{2}$ miles very few specimens were recaptured.

Theoretically, the complete destruction of all hibernating specimens should cause the insect to disappear. This result has been obtained in some places in Germany as regards *Culex*, but it is doubtful whether it is possible with Anophelines, which are more dispersed. Measures against the hibernating adults are useful in eliminating the infections of late autumn and winter, and in reducing the number of the first larvae and first winged generations, thus reducing the sudden rise in cases due to the second generation that opens the malaria season. The rapid development of the epidemic in July is due to the marked increase of Anophelines in June.

In conclusion the author urges that specific, intense campaigns against malaria in Italy will in many cases cause the latter to disappear, and thus render agriculture possible. At present public opinion seems satisfied with the view that the progress of agriculture will lead to the disappearance of the disease.

Gellert (H. H.). **Some Aspects of Typhus Fever in Transcaucasia, especially with regard to the Protective Measures against Lice-borne Disease.**—*Jl. R.N.M.S., London*, vi, no. 4, October 1920, pp. 389–399, 2 figs.

The clinical features and management of typhus fever are discussed, and the particular conditions arising through lack of sanitation in the Caucasus are described. Measures for the prevention of louse-borne diseases include attention to general hygiene and thorough disinfection of individuals, clothing, etc. Bedding and clothes were disinfected by means of steam with or without the addition of cresol, for which purpose a very simple apparatus was erected, the mechanism of which is described and illustrated.

Séguy (E.). **Les Moustiques de France.**—*Bull. Mus. National Hist. Nat., Paris*, 1920, nos. 1 & 2, pp. 51–58 & 141–147, 8 figs.

Tables are given to facilitate the identification of mosquitos found in France.

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